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## Educational News and Editorial Comment

### ORGANIZATION AND PUBLICATIONS OF THE OFFICE OF EDUCATION

Under the administration of Commissioner Cooper the United States Office of Education has been somewhat reorganized both with regard to its functions and with regard to the nature of its publications. There is every indication that the office is to become one of the most vital influences in American education. The following account of the organization and publications of the office was prepared by Henry R. Evans, acting chief of the editorial division, and was published in the *United States Daily*.

The Office of Education, formerly the Bureau of Education, was originally created an independent department of the government by an act of Congress approved March 2, 1867, and continued as such until July 1, 1869, when, according to a provision contained in one of the annual appropriation acts approved July 20, 1868, it was constituted an office or bureau in the Department of the Interior.

The Office of Education has no administrative functions except those connected with the expenditure of the funds appropriated by the federal government for the maintenance of colleges of agriculture and the mechanic arts in the several states, and in Alaska, Hawaii, and Porto Rico, and those connected with the education, support, and medical relief of natives of Alaska.

Under Commissioner William John Cooper, the reorganization of the office



Boston University
School of Education
Library

has been completed and put into effect. The Office of Education is established as a research organization rather than an administrative agency. Its policy is to transfer to other agencies its present administrative activities so far as possible and concentrate on research in the many fields of education. Under the present scheme of organization the Office of Education is divided into the following divisions: (1) administration, (2) research and investigation, (3) editorial, (4) library, (5) service, (6) general surveys.

During the fiscal year ended June 30, 1929, the office completed its survey of negro colleges and universities throughout the United States. The progress of the survey of land-grant colleges begun in July, 1927, was gratifying. Leading authorities in land-grant college education are now engaged in writing the tentative reports on the several aspects of the survey.

Plans have been laid for a nation-wide survey of secondary education, for which congress has authorized the expenditure of $50,000 during the current fiscal year, and $100,000 and $75,000 in the two succeeding years, respectively. . . . .

The Office of Education is, to a large degree, a publishing establishment, and it disseminates the information which it gathers through its specialists largely through the medium of its publications. A simplification in the general makeup of publications has been recently inaugurated. The following documents will be issued in the future: bulletins, pamphlets, leaflets, annual reports, biennial surveys of education, and reading courses.

The bulletin series will consist of studies of rather permanent interest and value in the various fields of education. They will ordinarily be thirty-two pages or over. Pamphlets, ranging usually from eight to thirty-two pages, will contain material of less permanent interest. Leaflets will range from two to eight printed pages.

The pamphlets and leaflets will take the place of the various divisional publications formerly listed as city-school leaflets, commercial-education leaflets, community-center circulars, extension leaflets, foreign-education leaflets, health-education publications (health-education series, physical-education series, and school-health studies), higher-education circulars, home-economics circulars, home-education circulars, industrial-education circulars, kindergarten circulars, library leaflets, miscellaneous publications, rural-school leaflets, secondary-school circulars, statistical circulars, and teachers' leaflets.

Sections of the Biennial Survey of Education will still be issued in advance of distribution of the entire volume. They will be listed as "chapters" in the government list of publications; the bound volume will be issued as a bulletin of the Office of Education. No changes will be made in the Annual Report of the Commissioner of Education or the reading courses.

Mimeographed circulars of current information and a survey information series will be issued from time to time; they will be announced in periodicals with other Office of Education publications.

The whole number of documents printed during the fiscal year ended June

30, 1929, was seventy-five, of which forty-seven were bulletins, seven leaflets and circulars, one Annual Report of the Commissioner of Education, ten numbers of *School Life*—the official organ of the office—and two miscellaneous publications.

The Biennial Survey of Education is the successor to the voluminous Annual Report of the Commissioner of Education, which was inaugurated by the first commissioner, Henry Barnard, and continued without break to 1917. The biennial survey differs from the report which preceded it principally in the interval between issues.

In the administration of Commissioner William T. Harris the report reached its greatest extent, and at one time filled two volumes of about 1,300 pages each. The biennial survey now issued is relatively of modest extent; that for 1922–24 was a single volume of 886 pages, and that of 1926–28, to be issued soon, will be even less bulky.

The material in these volumes is first issued in pamphlet form, and the several chapters are distributed separately as early as possible after their preparation. The bound volumes are reserved for libraries which will preserve them permanently.

## GOVERNMENT INSPECTION OF PRIVATE SCHOOLS

The following editorial appearing in the London *Times Educational Supplement* raises sharply the issue of government inspection of private schools in England.

The action that is being taken by the Brighton and Hove Education Committees in the matter of private schools is timely, and the subject should be considered with a view to action by every education authority in the country. The Board of Education have given no recent lead on this vitally important matter despite the fact that the Labour Party, on the eve of the last general election, declared that the inspection and licensing of private schools formed part of the educational policy of the party. Indeed, a little over a year ago Sir Charles Trevelyan stated in the House of Commons that he was not yet clear what alteration in the law would be necessary to enforce a reasonable standard of efficiency. There is a good deal of unrest among local education authorities, since they feel that there is no move being made at Whitehall. In the spring of 1928 the Wolverhampton Corporation strove to incorporate in their corporation bill a clause dealing with private schools, but the Local Legislation Committee of the House of Commons struck the clause out on the grounds that there were no precedents for clauses of that type. In fact, there were many precedents of the same type, though not on the subject of education. A deputation from the Headmistresses' Association in February, 1929, was received by Lord Eustace Percy and the Duchess of Atholl, and laid before them various convincing arguments in favor of a standard of efficiency for private schools. The deputation stated that it is "open for anyone, whether qualified or unqualified, to start a

school in any premises, of any size, and to undertake the training of any number of children of any age range." Schools, it may be added, are now open, both boarding schools and day schools, which give under the guise of education a schooling of which Mr. Squeers would be ashamed, in many cases at high cost and yet in non-sanitary premises. Some of these pretentious schools have been started since 1921, and the Board of Education are in a position, under section 155 of the Education Act, 1921, to deal with them. Yet nothing is done. The good private school is one of the great educational assets of the country, but who can tell the schools that are good in the present state of affairs?

It has been left to local authorities to take action on their own account, and Brighton and Hove have opened the campaign. Section 42 of the Education Act, 1921, states that it is the duty of the parent of every child of school age "to cause that child to receive efficient elementary instruction in reading, writing, and arithmetic," and no school can defend proceedings unless it is open to inspection by the local education authority or by the Board of Education and unless satisfactory attendance registers are kept. In the Brighton and Hove cases the schools were inspected on sanitary grounds at the instance of the Ministry of Health, and during the inspection it was found the children were not being educated in a satisfactory manner. The procedure followed was very simple. The principals were informed that section 42 of the act of 1921 was not being complied with, and the parents were informed that they must make arrangements to give their children adequate education. The case of elementary dame schools can, therefore, be dealt with everywhere with the assistance of the Ministry of Health. Yet this leaves open the case of so-called secondary schools or "academies" or "colleges." These can also be entered at the instance of the Ministry of Health and closed if the sanitary conditions demand it. But if the sanitary conditions pass the test of the local medical officer of health and if the pupils are of such an age as to make it certain that they can read, write, and cipher, nothing can be done unless the school has been opened since 1921. What is the possible remedy?

The onus lies upon the Board of Education, which has apparently no full register of private schools. Such a register should be compiled without delay. There would be no difficulty if the Board worked with its partners, the local education authorities. The next step will be with the Ministry of Health. Bad sanitary conditions, especially in the case of boarding schools, almost always accompany bad educational facilities. The official register must be rigorously searched. In the case of schools founded since 1921 the Board must be presumed to have a register. No doubt the Board of Education will plead as an excuse for its inaction in the matter of private schools during the last decade the mass of other work that has fallen to their lot. The reconstruction of the local system of education has, moreover, demanded close attention in the matter of the schemes of the local authorities. But, it must be asked, do those schemes, and if so how many of them, deal with the question of private schools? An answer to this question might fitly be given by the president of the Board when

Parliament meets. In the reconstruction of the educational system of a local area the private schools, some of them attaining the status of public secondary schools, must play an important part, and it is very necessary for parents to know what private secondary schools are of such a status as to make it desirable to use them. Is Sir Charles Trevelyan yet in a position to say what alteration in the law is necessary to enforce a reasonable standard of efficiency in all classes of schools? It ought not to be difficult, and it is not satisfactory to have to secure access to school premises through the intervention of the Ministry of Health. The right to enter any school premises and report on the type of education given there ought, at any rate, to be given to the local education authority.

The editorial is timely both with respect to the private schools in England and in the United States. It is a curious public policy, anomalous at least, which permits a state to maintain a compulsory school system and at the same time allows private and parochial schools to operate with no means reserved to the state of determining their standards of efficiency. The situation in England and in the United States is what it is largely because of historical tradition; it would be difficult to justify it on any basis of sound public policy.

### REORGANIZATION OF SCHOOL ADMINISTRATION IN CINCINNATI

In a recent issue of the *School Index* Superintendent Edward D. Roberts describes as follows the significant administrative reorganization which has been put into effect in the public-school system in Cincinnati:

On the sixteenth of June the Board of Education adopted several resolutions submitted by the Bureau of Governmental Research, which had been making a study of school conditions in Cincinnati for several years and whose considerations and consequent recommendations had been before the members of the board for informal consideration for nearly a year, which effect fundamental changes in the central organization of the schools and modify greatly the procedures of principals, directors, and assistant superintendents in a number of important respects. These changes are too far-reaching in their meaning and effect to be completely appreciated yet. To make adequate explanation of them, with such explanation as would serve to justify each of the proposals finally incorporated by action of the Board of Education, would demand more space than is available in this brief bulletin and probably more time on the part of most readers than the writer of the bulletin might assume he could have. Consequently, only a very brief summary of the changes is given herewith, and this statement is made in order that the workers in the schools may have at least a general idea of what has happened.

The first action was the adoption of a resolution "defining the duties and status of the superintendent of schools and providing for the organization of his office in relation thereto." This resolution provides that the superintendent of schools shall be the chief executive and administrative officer of the Board of Education, with definite responsibility to the board for the administration of all policies adopted by the board. In consequence of this action the superintendent definitely becomes the directing officer responsible for all employes of the Board of Education except the clerk-treasurer and his staff, who, by virtue of the fact that that office is created by statute and independent of the superintendent, cannot be involved in subordinate relationship to the superintendent. Hereafter the board will receive all reports and recommendations from the superintendent of schools alone and will transmit all directions and instructions to him alone. The superintendent then becomes responsible, by the resolution, for the completion of all transactions which are not required by law or resolution to be brought before the board.

The general purport of this action is to insure that the administration of the schools shall be professionally directed and, further, that the members of the Board of Education shall be free from the necessity of giving detailed attention to administrative, routine procedures, general control over which will continue to be exercised by the board through the determination of policies, the adoption of the budget, and the like.

In the resolution there is created a Bureau of Personnel which shall have the responsibility of controlling all personnel procedure, including substitutes, and of finding and recommending for appointment all individuals who are to be appointed as teachers in the schools. There is constituted, also, a Bureau of School Research, which will have as its responsibility the ascertaining of information, the formulating of the same in such reports as may be "useful in the conduct and administration of the schools." There is also constituted a Bureau of Public Relations, which will be responsible for co-operating with organizations and individuals in matters relating to the welfare of the schools and will be responsible for the publication of material aimed to afford information regarding the schools.

In addition to the above resolution, a second resolution was adopted, "establishing a Department of Business Administration and defining its duties." This department is to be under the direction of the superintendent and in charge of an assistant superintendent, the present business manager performing the functions of such assistant superintendent. In this department there is established a division of housing, a division of supplies, a division of lunchrooms, and a division of finance, the duties of which are reasonably well explained by the titles given to them.

In addition to the above action, the board authorized the adoption of a new accounting system, prepared under the responsibility of the Bureau of Governmental Research by the New York firm which organized and installed the

accounting system of the city of Cincinnati and that of the state of Ohio. In addition to a wonderfully ideal and scientifically organized accounting system, use will be made of an accounting machine, so that it is expected that there will be available readily, if not, indeed, at all times, accurate and detailed statements of expenditures and costs, which will enable the Board of Education or the superintendent of schools to analyze various elements of cost in the entire school organization and to reach judgment upon the same in the light of accurate and absolutely current information.

### NON-RESIDENT TEACHERS EXCLUDED FROM THE SCHOOLS OF BOSTON

The *New York Sun* reports the following action taken by the Boston school committee.

Beginning next Monday, Boston will bar all non-residents of the city from appointment as teachers in its public schools. This action was taken by the Boston school committee by a three-to-two vote after Dr. Jeremiah E. Burke, superintendent of schools, aided by former Chairman Francis C. Gray and Mrs. Elizabeth W. Pigeon of the committee, opposing the plan, had warned that its adoption would make Boston the only large progressive city in the United States limiting itself to choosing its teaching staff from residents. The proposal was carried by the votes of Chairman Hurley, Dr. Joseph V. Lyons, and William A. Reilly.

In addition to barring non-residents from its school faculties, the committee, by the same vote and after a long fight, decided to make the Teachers College a provincial institution and to limit candidates for admission to legal residents of the city on and after September 1, 1931.

A third order, affecting school custodians, laborers, and others in the employ of the school department, was also passed by the vote of three to two. This order states that no person shall be appointed to any position in the employment of the school committee after January 1, 1931, who is not a legal resident of Boston, provided that the order shall not affect those already on the elective lists or in the civil-service lists for Boston service. It will not affect those who have been appointed to Teachers College up to January 1, 1931.

One wonders why such action was taken. Is it due to self-complacency, to the fact that Boston has a surplus of resident teachers, or are there interests in Boston concerned with keeping the appointment of teachers and other school employes within their control?

### AN ATTACK ON SCHOOLS OF EDUCATION

The following editorial was published in the *Youngstown Vindicator*, Youngstown, Ohio.

One of the foremost educators of this country, whom the *Vindicator* consulted in its endeavor to learn which institution would be the best to conduct the proposed survey of Youngstown schools, writes to this newspaper:

"I am so out of sympathy with the pedagogic method of all our schools of education and I am so convinced of the mediocrity of the ideas which issue from these schools that I have little choice in ranking them according to merit. I may say, however, that I consider that the Teachers College of Columbia has done almost irreparable damage to general education in this country. As I feel that the philosophic ideas of education of Mr. Dewey and the psychological system of Mr. Thorndike are both wrong and exceedingly pernicious and as they dominate the methods of the Teachers College of Columbia, I should regret having any teachers trained in that school.

"Now when it comes to what you call a survey, I should judge that it is not a question of what shall be taught or what not, but whether what is done is carried on in as satisfactory a way as possible, and that it would make very little difference whether the survey were carried on by graduates of either of the colleges you mention. From examiners of these two educational colleges, and in fact from any other in the country, you cannot get away from what seem to me fads, nor can you introduce into your schools a more humanistic spirit.

"That is, the whole basis and ideal of our public-school education is unsatisfactory to me. I think real education depends in childhood on the accumulation of well-established facts and of a discipline of mind which comes from the study of long-established subjects. I believe that it is essential to train the memory as far as possible and to teach the child that subjects should be taught whether they are pleasant or not."

The *Vindicator* has objected all along to Columbia as the source of most of the fads in modern education: indeed, the criticism of Professor Dewey which it printed a few months ago has been given wide circulation all over the country. It has not been aware, however, that Columbia methods have been so generally adopted by other colleges that it is impossible to obtain a survey that would not be colored by them. Under the circumstances, it would seem that the board of education and the superintendent would have to get together and agree on what courses they want in Youngstown schools and how they wish them to be taught. In the end this may prove to be the best way.

Attacks of this kind may be deplorable, but they are not difficult to understand. It seems perfectly clear that they are motivated chiefly by economic considerations. There is some indication that business men are becoming somewhat restless with respect to the cost of the public schools, especially in those regions where the antiquated taxing systems of the states impose the burden of supporting schools chiefly on real property. No doubt such attacks are in part

the result of a failure to understand what the schools are actually accomplishing and what the educational needs of the country are.

There are two ways to meet attacks of the kind made by the *Youngstown Vindicator*. One is to continue educating the public so that they will understand the importance of education and its support. Those charged with the conduct of the public schools should undertake vigorously the task of informing the intelligent people of the community with respect to the work the schools are undertaking to accomplish and with respect to the educational needs of the community. The second way is to reform our system of taxation in such a manner as to relieve real property from maintaining such a large part of the burden of school support.

## INVESTIGATION OF THE PROBLEMS INVOLVED IN THE EDUCATION OF THE DEFECTIVE CHILD AND OF THE NEGRO

The following statement was published in the *United States Daily*.

Two new services, under the leadership of specialists, for the investigation of special educational problems which have heretofore been given consideration only as aspects of the general educational service have just been established in the federal Office of Education. . . . .

One of the two divisions will deal with the education of children of the mentally and emotionally defective type, under the direction of Elise H. Martens, specialist in the education of exceptional children, and the other with the co-ordination of the various activities and interests of the government in negro education, under the direction of Dr. Ambrose Caliver, former dean of Fisk University, and a specialist in negro education.

Concerning the new division for the study of exceptional children, the office made public the following information:

The federal Office of Education has established a new service in the field of special educational problems. It will be the aim of this service to assist school systems throughout the country in planning for the education of children who are mentally or emotionally of exceptional type. It will initiate and conduct studies of the educational and social needs of mentally deficient or backward children, of children with specific educational and mental handicaps, and of psychopathic or nervously unstable children. It will report the work that is being done in the various centers on behalf of such children and will co-operate with school officials in the organization of special classes and programs of work.

Specialists agree that maladjustment in the early school years is frequently the forerunner of social maladjustment and delinquency in adult life. Scientific

investigations show that the juvenile offender is likely to be a child who is mentally, physically, or emotionally handicapped and that crime and psychosis in the adult may often be traced to the unhappiness, the mental or physical unfitness, of the child. Education, therefore, faces the problem of making satisfactory provision for those children who need special adjustment if it is to contribute to the world the best it can give to social welfare and law enforcement. The new position in the Office of Education is a step in the direction of its solution. . . . .

With reference to the new division for the consideration of negro education, the office made public the following information:

During the past year a new position was created in the United States Office of Education which is to be known as "specialist in negro education." The aim of the office ultimately will be to co-ordinate the various activities and interests of the government in negro education. Its specific and immediate function is to serve as a clearing house on information concerning negro education; to conduct, direct, and encourage educational research; to stimulate interest in the present status and future possibilities of negro education; and to assist in co-ordinating the various researches, activities, and interests of negro schools and of persons concerned in negro education and related matters.

In realizing these purposes, the office will endeavor to collect facts of all kinds bearing directly and indirectly on negro education and make periodic digests of educational literature dealing with, or which may be of use to, negro education. The specialist in this office will visit schools and communities throughout the country, make contacts with school officials and others who are interested in negro education, attend and address meetings of educational and other organizations on topics relating to his specialty, and will act as consultant on negro education with anyone desiring his services. In performing his duties, the specialist will endeavor to confer with, and utilize the services of, specially qualified persons in the various fields throughout the country and will attempt to focus on the problems of negro education all the expert knowledge, technique, and educational forces available in the nation.

## MAKING AVAILABLE RESEARCH STUDIES OF CITY SCHOOL SYSTEMS

The Office of Education has recently issued Circular No. 18 entitled *List of Educational Research Studies in City School Systems, No. 1.* The purpose and content of the circular are described in the Foreword as follows:

As an outcome of the Conference on Co-operative Research, held at Atlantic City, New Jersey, February 27, 1930, the Office of Education is planning to issue, from time to time, lists of research studies in education undertaken by city school systems, in order that city superintendents throughout the country might be kept informed concerning experimental research projects which are

being carried on by city-school research bureaus. This service will be in addition to the annual printed bibliography containing a list of research studies in education undertaken by all research agencies, including city research bureaus. It is hoped in this way that it will be possible to get the information concerning city schools into the hands of those interested much more promptly than would otherwise be possible.

This is the first of the series to be issued and contains three lists: the first, giving information concerning 373 completed studies; the second, listing 209 studies now in progress; and the third, listing studies contemplated for the school year 1930–31. The material for inclusion in this circular was received in response to letters sent in May, 1930, to all city school systems engaged in educational research. A follow-up letter was sent out in August, 1930, to those not replying to the earlier letter. The list of completed studies, covering the period from July, 1929, to August, 1930, contains some studies reported in response to earlier requests. One hundred and one cities are represented in the three lists.

All three lists are classified by subject, the first two by author under subject, and the third by city, as in many cases no definite information was available concerning the probable author. Immediately following the lists are three indexes: one by author; another by subject, which will prove helpful in locating material on a particular subject; and the third by city, showing the cities represented in the lists. The studies are numbered consecutively throughout and indexed by number. In the case of studies which are known to be in typewritten or mimeographed form, the number of pages, when known, is given, with the abbreviation "ms." following it. Following the indexes some studies are listed concerning which information was received too late for inclusion in the numbered lists.

We wish to make these lists as useful as possible to all persons interested in educational research in city school systems. If the material is to be issued without undue delay, it is necessary that city-school research bureaus make complete and prompt reports to this office of all investigations in education undertaken under their supervision.

There has long been a need for the kind of information supplied in this circular. City-school officials everywhere cannot be urged too strongly to co-operate fully and promptly with the Office of Education in making available the results of investigations carried on in their school systems.

### A DECADE OF PROGRESS IN RURAL-SCHOOL CONSOLIDATION

A recent pamphlet published by the Office of Education and entitled *Rural School Consolidation* gives a great deal of information about the development of rural-school consolidation during the dec-

ade 1918–28. On the basis of states reporting, in 1917–18 there were in the United States 195,397 one-room schools; in 1927–28 there were 153,306 such schools. In 1917–18 twenty-eight states reported 5,349 consolidated schools; the total number of consolidated schools in that year was estimated at 7,500. For the year 1927–28 forty-three states reported 17,004 consolidated schools, the total estimated number for the year being 17,500. The number of one-room schools for the year 1927–28 ranges from 97 in Rhode Island to 10,105 in Illinois. The one-room school is found most commonly in some of the mid-western and eastern states. The states with the largest number of such schools in 1927–28 were as follows: Illinois, 10,105; Iowa, 9,585; Pennsylvania, 7,821; Missouri, 7,393; New York, 7,350; Kansas, 7,200; Minnesota, 6,997; Wisconsin, 6,665; Michigan, 6,372; Kentucky, 6,256; and Nebraska, 6,081.

In 1927–28 the consolidated-school movement had made the greatest progress numerically in Indiana, Ohio, and some of the southern states. The states having five hundred or more consolidated schools in 1927–28 are as follows: Indiana, 1,483; Texas, 1,195; Ohio, 1,031; Mississippi, 988; Georgia, 984; North Carolina, 951; Tennessee, 822; Virginia, 812; Massachusetts, 667; Pennsylvania, 524; Alabama, 513; North Dakota, 503; Louisiana, 500. During the decade the following states closed 25 per cent or more of their one-room schools: Arkansas, Connecticut, Delaware, Georgia, Indiana, Maryland, Massachusetts, Nevada, New Hampshire, New Jersey, North Carolina, Ohio, South Carolina, Tennessee, Texas, Virginia, and Washington.

In 1919–20 the number of pupils transported to school was 350,100; in 1927–28 the number transported was 1,250,574. The total amount spent for transportation in 1917–18 was $7,960,966; in 1927–28 the total cost of transportation was $39,952,502.

### RELATION OF THE FEDERAL GOVERNMENT TO EDUCATION

The National Advisory Committee on Education is attempting to define the proper relations of the federal government to education. For a number of years the National Education Association has been vigorously advocating the creation of a department of education with a secretary in the president's cabinet. Proposals on the subject

of federal relations to education are many and various. It is by no means clear as yet what will be the ultimate solution of this problem.

Intelligent citizens everywhere will, no doubt, welcome any information which may enable them to clarify their thinking on this subject. Two such sources of information have been made available by the Office of Education. One is a bulletin entitled *Digest of Legislation Providing Federal Subsidies for Education* (Bulletin No. 8, 1930). This bulletin traces in detail the legal history of the fiscal relations of the federal government to education in the states. It contains an extended bibliography of the literature relating to federal subsidies for education. The other source of information is also a bulletin published by the Office of Education entitled *National Ministries of Education* (Bulletin No. 12, 1930). This bulletin contains a wealth of information about the office of the ministry of education in other countries. It should prove to be an exceedingly helpful document to all who are interested in redefining the relation of our federal government to education.

### THE ELLA VICTORIA DOBBS FELLOWSHIP FOR RESEARCH IN EDUCATION

Pi Lambda Theta, honorary fraternity for women in education, is offering a fellowship to a woman who wishes to devote herself to research in education. This fellowship is known as the Ella Victoria Dobbs Fellowship of Pi Lambda Theta and carries a stipend of $1,000, available for the year 1931–32. The candidate for this research fellowship must have at least the degree of Master of Arts from a graduate school of recognized worth. It is required further that she shall have shown notable skill in teaching and significant accomplishment in research. She must have definite plans for further research. The successful candidate will be expected to devote herself to study or research as outlined in her application, and at the end of the year to submit to the committee in printed form the results of her study or investigation. Applications with all supporting documents must be in the hands of the committee not later than January 1, 1931. Further information with regard to this fellowship may be obtained from Delia E. Kibbe, State Department of Public Instruction, Madison, Wisconsin.

## A NEW TEACHER-TRAINING SCHOOL FOR THE UNIVERSITY OF KENTUCKY

The following statement is quoted from the *New York Sun.*

As a result of a gift of $150,000 from the General Education Board, matched by a similar sum appropriated by the Legislature of Kentucky, a modern teacher-training school has just been completed for the University of Kentucky and stands ready to begin in a few weeks its work of preparing teachers for the schools of the state. The building is located on a fourteen-acre site and has a floor space of more than two acres.

The organization of the school is different, perhaps, from that of any training school in the United States.

The work starts with three-year-old children in the preschool group, the preschool unit being made up of the nursery school and the kindergarten. Both these groups, part of a demonstration center for the prospective teachers, will be under the supervision of one teacher, who with two or three assistants will carry on the work of the unit.

An elementary school will be made up of the kindergarten and the first six grades. Every grade in the elementary division has a large classroom and a smaller group room, so as to make possible a division of any grade into two groups in order to take care of more individual instruction than is ordinarily possible.

No child in any room in the entire training school will ever be called upon to climb more than one flight of stairs. There is no basement in the building, and there is no attic. There are just two floors in the building, and all the work will be done on these two floors.

The arrangement of the high-school division is quite similar to that of the elementary school. Most of the rooms are divided into large classrooms with smaller group rooms to provide for a large amount of individual instruction.

The entire training school will be under the direction of Professor Sherman G. Crayton, formerly of the University of Indiana. The elementary division will be under the supervision of Mrs. May K. Duncan, a graduate of the University of Kentucky and of Columbia University.

## A GRADED LIST OF BOOKS FOR CHILDREN

The American Library Association, 520 North Michigan Avenue, Chicago, makes the following announcement.

*Graded List of Books for Children,* in a second and entirely revised edition recently published, presents approximately twelve hundred titles suggested for purchase by the school library in the first nine grades including the junior high school.

Books for home and leisure reading have been chosen to link up interests aroused in the classroom and to create new interests for children whose contacts outside of school are limited. Although the volumes are arranged in three groups,

for Grades I–III, Grades IV–VI, and Grades VII–IX, a specific grade or range is assigned to each title. Information to assist in buying the books is given as well as information with regard to cataloging and classifying.

For those children who have in their daily lives little opportunity to see beauty in line and color, some of the finely illustrated editions have been included. Standard classics, recent books, and reference works comprise the selection. . . . .

In compiling the list, suggestions from specialists in children's literature were submitted to the vote of fifty children's librarians and instructors in children's literature. Anne T. Eaton, librarian of the Lincoln School of Teachers College, Columbia University, was chairman of the committee in charge of formulating the list, which was edited by Nora Beust, teacher of children's literature at the University of North Carolina.

### THE USE OF THE BIBLE AS A REFERENCE BOOK PROHIBITED

The *United States Daily* published the following statement.

Use of the Bible in the public schools in the state of Washington "as a reference book because of its relationship to publications in literature and history" is prohibited by a constitutional provision which "interdicts the giving of any and all Bible instruction in the public schools," according to an opinion by the assistant attorney general of Washington, E. W. Anderson.

The opinion, delivered at the request of the state superintendent of public instruction, N. D. Showalter, follows in full text.

"We are in receipt of your letter which reads:

" 'In the public schools of this state it frequently becomes necessary to refer to the Bible as a reference book because of its relationship to publications in literature and history which are used and adopted as our lawful texts. Our books on ethics frequently refer to the Bible as a source from which equality, justice, and fraternity first spring. Quotations frequently call for further reading and research also, so that its use in public education has come to be a necessity as a library of information.

" 'You are familiar with the fact that our government is based upon certain principles of justice and equality, which were presumably borrowed from "The Book," that each elected official is required to take an oath, and that every court of justice is required to administer oaths based upon the injunction found in the teachings and writings.

" 'Because of these things, it seems necessary to refer to the original sources as the best evidence of rights and duties of citizenship in order to teach the fundamental truths governing our social order. It therefore seems apparent that, whether or not we accept the Bible upon the same basis, its teachings and references have come to be important in public education and its use seems to become in greater and still greater demand.

" 'I am familiar with the ruling made by the attorney general's office some years ago, but I do not feel altogether certain as to how far we may go in the using of the Bible without violating either the spirit or the letter of our state's supreme law.

" 'I shall greatly appreciate your opinion set forth anew on the use of the Bible in the public schools in the manner I have indicated, in order that I may direct our public-school service in conformity with the laws of our state.'

"We have passed upon this or analogous questions on a number of occasions holding that the constitution, especially Article I, Section 11, interdicts the giving of any and all Bible instruction in the public schools (1 Ops. Atty. Gen. 142, Ops. Atty. Gen. 1909–10, p. 135, 1915–16, p. 254). The question was exhaustively considered by the Supreme Court in *State ex rel. Dearle* v. *Frazier*, 102 Wash. 369, and a similar conclusion reached. The plan therein condemned contemplated the giving of certain credits for outside instruction upon the 'historical, biographical, narrative, and literary features of the Bible only.'

"The argument was advanced that this did not necessarily involve 'religious instruction' within the meaning of the constitution, but the Supreme Court held that the term 'religious instruction' was used in the constitution in its broad, rather than sectarian, sense and, therefore, included any form of Bible instruction. A careful reading of the opinion of the Supreme Court in the cited case leads us to the conclusion that the use of the Bible in the public schools 'as a reference book because of its relationship to publications in literature and history' is prohibited."

### STATE AND SCHOOL TAXES IN KANSAS

In the September issue of the *Elementary School Journal* some paragraphs were quoted from a bulletin published by the University of Kansas. It was stated therein that from 1916 to 1928 state taxes in Kansas increased 97 per cent and that school taxes increased 202 per cent. Superintendent W. W. McConnell, of Winfield, Kansas, has called attention to the fact that the increase in the state tax as such should not be regarded as representing the total increase of the state's revenue. His point is that since 1916 the state has devised new ways of raising revenue in addition to the state tax proper.

# TAXATION AND PUBLIC-SCHOOL FINANCE

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Educators as a group have never been as keenly interested in taxation and school finance as the importance of these subjects merits. They seem to have sublime faith in the opportune arrival of financial assistance when need arises. There is surprisingly little evidence in current educational literature that school people, in general, realize adequately the serious crisis in taxation and school finance now confronting the schools. This crisis is the result of two pronounced, although unrelated, tendencies. On the one hand, school costs are constantly mounting. On the other hand, the basic tax system, the general property tax, is obsolescent and disintegrating. Between enlarging needs on the one side and an inadequate tax system on the other, the schools find themselves ground as between the upper and the nether millstones.

The trend of school costs in recent years indicates continuing increases in annual expenditures for years to come. In 1927–28 the total payments in support of public elementary and secondary schools were $2,184,000,000 as compared with $215,000,000 in 1899–1900, an increase of 916 per cent in 28 years. School costs first passed the billion-dollar mark in 1919–20, when the total expenditures equaled $1,036,000,000. The two-billion-dollar mark was reached six years later when the expenditures totaled $2,026,000,000. For each child in average daily attendance the cost was $105.99 in 1927–28 as compared with $64.16 in 1919–20. Between 1899–1900 and 1927–28 the cost per day for each pupil increased from $0.14 to $0.618, an increase of 341.4 per cent. These increased expenditures resulted from four causes: (1) the depreciation of the dollar, (2) increased attendance, (3) the disproportionate increase in high-school attendance, and (4) the increase in the number and quality of services rendered by the schools.

The depreciation of the dollar—its decreased purchasing power as compared with that in pre-war times—is an important, but not sufficiently recognized, cause of increased expenditures for schools. As compared with 1913 the index number of the cost of living in 1927–28 was 171. In other words, 71 per cent more dollars were required in 1927–28 to have a purchasing power equivalent to that of a given number of dollars in 1913. That is, if a teacher received a salary of $1,000 in 1912–13 and $1,710 in 1927–28, the purchasing power of her salary for those two years would be exactly equal. Her nominal salary in 1927–28 would be greater by 71 per cent; her real salary, or her purchasing power, would be the same for the two years. The dollar of 1927–28 would purchase only as much as 58.5 cents would buy in 1912–13. The salaries of teachers constitute about two-thifds of all school costs. Because of the shifting value of the dollar, salaries cannot be properly measured merely by the number of dollars of which they are composed. They are measured accurately only by the application of the cost-of-living index—the amount of food, clothing, shelter, the necessities and the luxuries of life for which the salary dollars can be exchanged. In 1912–13 the average salary of teachers was $513, and in 1927–28 it was $1,364. In dollars this increase represented an increase of 165.9 per cent; in buying power it represented the much more modest increase of 55.5 per cent.

School costs generally must be interpreted in the same way. The expenditures for public schools in 1913–14 were $555,000,000; in 1927–28 they were $2,184,000,000, an increase of $1,629,000,000, or 293.5 per cent. However, it would have taken 949,000,000 of the 1927–28 dollars to equal the buying power of the $555,000,000 spent in 1913–14, while the equivalent purchasing power of the $2,184,000,000 in terms of 1913 dollar values would amount to but $1,277,000,000, which is only $722,000,000 more than the cost of the schools in 1913–14. When the depreciation of the dollar is taken into account, the *actual* increase in school costs in this fourteen-year period is found to be 130.1 per cent.

Increased attendance is a second cause of increased costs. Between 1913–14 and 1927–28 the aggregate days of schooling increased from 2,112,000,000 to 3,535,000,000, an increase of 67.4 per cent. That percentage must be added to the index-basis cost in

1913–14—$949,000,000—to arrive at a comparable cost in 1927–28. In this way it is found that $1,589,000,000 is the necessary cost of the schools in 1927–28 when two factors, depreciation of the dollar and increased attendance, are duly allowed for.

A third cause of increased costs is the disproportionate increase in high-school attendance, since the per capita cost in high school is more than 50 per cent higher than in the elementary school. In 1914–15 the number of pupils in high school was 6.7 per cent of all pupils in elementary and secondary schools combined; in 1927–28, 15.5 per cent. The difference between these percentages is 8.8. Adding half this difference (4.4 per cent of $1,589,000,000) to the previously calculated cost gives a total of $1,659,000,000 as a conservative estimate of necessary costs when the three factors of money value, increased attendance, and disproportionate high-school attendance are considered.

The remaining portion of the increase in expenditures within the period specified may be regarded as the cost of the increased quantity and the improved quality of services rendered. This increase amounts to $525,000,000, or 31.6 per cent of the $1,659,000,000 required in 1927–28. Whether this increase is justified depends on the point of view of the critic. Among the extensions of service are improved health instruction and physical education and adaptations to individual needs, especially in the form of special classes for deaf, partially blind, crippled, and otherwise handicapped children. School buildings are of better construction and are better equipped, and teachers are better prepared.

The schools are not alone in making increasing demands on taxation. The trend in taxation is upward, but the proportion of taxes going to the schools has not increased. In 1913 the national income was $33,200,000,000, of which $2,194,000,000, or 6.61 per cent, went for taxes; in turn, $522,000,000, or 23.79 per cent of the taxes, went to the schools. In 1926 the income was $84,150,000,000, and the total of taxes was $8,555,000,000, or 10.17 per cent of the income. In that year school costs amounted to $2,026,308,190, or 23.69 per cent of the taxes. Approximately one dime of each income dollar is spent for taxes, and about one-fourth of the taxes go to the support of the public schools.

The various processes by which this dime is subtracted from each dollar of income and made available for common purposes constitute taxation. The basic tax system in use in the United States is the general property tax; that is, each owner of property pays in taxes a certain percentage of its value annually. The chief defect of the general property tax is its failure to conform to the basic tenet of taxation that everyone should be taxed in accordance with his ability to pay. Taxes, no matter on what basis they are levied, must be paid out of income. Under pioneer conditions the value of property constituted a fairly approximate measure of income; but under modern industrial conditions, because of the exceedingly complicated financial structure of today, the amount of tangible property owned gives no clue to a person's ability to pay. Moreover, taxation is based on legal ownership and ignores economic ownership. For instance, a man who buys a $6,000 home immediately begins paying all the taxes on it even though he is able to pay only $3,000 of his own money and borrows the remainder. Legally, he owns the home; economically, he owns only half of it. The man or the corporation from whom he borrowed the money holds his note secured by a mortgage. Such economic ownership is distinguished from legal ownership or possession by the term "intangible property."

Everywhere property in the intangible form of stocks, bonds, mortgages, etc., tends to escape taxation. At the same time, intangible property is increasingly the form which property in the economic sense tends to assume. The result is that to a constantly greater degree the legal owners of tangible property carry the tax load. Under the system of general property taxes a farmer owning a $30,000 farm cannot escape paying taxes on it even though there is a crop failure and the farm, temporarily at least, is a liability rather than an asset. Another man with $30,000 invested in stocks and bonds pays no taxes at all on them although manifestly he is in much better position to pay taxes than the farmer whose crops have failed. Again, one of two physicians having the same tangible-property values in homes, offices, automobiles, etc., may have a practice netting $5,000 a year and the other a practice netting $50,000. The taxes of the two men are the same although their tax-paying ability is vastly different.

The general property tax is utterly inadequate to meet modern needs and conditions. It is an outgrown institution as far behind the times as the oxcart would be as a means of transportation. It is universally and scathingly condemned by every recognized economist and student of taxation. Consider for example, this severe indictment by Seligman.

> Practically, the general property tax as actually administered is beyond all doubt one of the worst taxes known in the civilized world. . . . . It puts a premium on dishonesty and debauches the public conscience; it reduces deception to a system and makes a science of knavery; it presses hardest on those least able to pay; it imposes double taxation on one man and grants entire immunity to the next. In short, the general property tax is so flagrantly inequitable that its retention can be explained only through ignorance or inertia. It is the cause of such crying injustice that its alteration or its abolition must become the battle-cry of every statesman and reformer.[1]

While legislators and tax commissioners debate and delay, the system of general property taxes is disintegrating before our eyes. Under the pressure of revolutionary changes in industry and finance, its rusty machinery creaks at every joint and wabbles along toward complete breakdown. As property, in the economic and tax-paying-ability sense, increasingly shifts to intangible forms, the tax-paying base sometimes remains practically stationary while the tax burden constantly increases. In the state of Washington, for example, the assessed valuation of property has long remained about the same although the population increased 15 per cent during the last decade. This assessed valuation is about $1,200,000,000, which is approximately the same in amount as the annual income of the people of Washington. The actual value of tangible property in this state is about five times that upon which taxation is based; hence, the rate must necessarily be five times as high as it would be if based on actual valuations. Under these conditions farms and homes carry such an undue portion of the tax burden that taxes approach the point of confiscation. In many instances the owners of vacant city property and of the poorer farms give up possession of their property rather than continue to pay taxes thereon. This situation, in turn, further decreases the tax base and increases the rate of taxation, and still

[1] Edwin R. A. Seligman, *Essays in Taxation*, p. 61. New York: Printed for Columbia University Press by Macmillan Co., 1900 (third edition).

other persons are forced to give up their property rather than pay increasing taxes. It is in such a vicious circle of decreasing base and increasing rate that we now find the general property tax system. The only possible remedy is to abandon the general property tax as the basic tax and employ it for local use only. The income tax should be substituted as the chief source of taxes for state purposes. The income tax meets fully the tenet of faculty, or ability to pay. Taxing on this basis has passed the experimental stage and is being successfully carried out in about one-fourth of the states.

The income tax should be supplemented by a sales tax on certain luxuries. The phenomenal success of the gasoline tax, which yielded almost $500,000,000 in 1929, shows the possibilities inherent in this form of tax. However, a general sales tax should not be employed because such a tax penalizes the taxpayer of little means and thus violates the tenet of faculty.

Education is costing more and more for reasons which seem to justify the increased costs. Taxes are constantly increasing. At present, taxes take about one dime from each dollar of income, and education receives about one-fourth of each tax dime. Opposed to the increase of taxes is the disintegration of the present basic tax system, the general property tax. America is amply able to finance education, but dependence cannot longer be placed on the antiquated and inequitable general property tax. Since it is imperative for the welfare of education that the taxing machinery be modernized, educators should study taxation and be prepared to help actively in its much-needed reconstruction. If the taxing system is not reconstructed, the schools will face a period when the financial support given them will be insufficient, notwithstanding the favor with which Americans regard their schools.

# AN EXPERIMENTAL STUDY OF THE EFFECT OF THE METHOD OF INSTRUCTION ON TRANSFER OF TRAINING IN ARITHMETIC

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## PURPOSE OF THE INVESTIGATION

The purpose of the investigation summarized in this article was to measure the effect of instruction given in three types of examples in two-place addition upon the pupils' ability to handle closely related types in two- and three-place addition and subtraction and to determine whether the amount of transfer is a function of the method of teaching. More specifically the problem was to determine whether the amount of such transfer can be increased (1) by helping the pupils to generalize consciously the process and formulate, from the three types taught, a general method of procedure applicable to the related types; (2) by rationalizing the process, that is, by considering the underlying principles; and (3) by combining generalization and rationalization.

## THE PROCEDURE

The experiment was carried out in fifty-two second-grade classes in Toledo, Findlay, and Bowling Green, Ohio, during the school years 1927–28 and 1928–29. These classes were divided into four groups, each being taught by a different method.

At the conclusion of the experiment from the records of the pupils, the pupils were separated into groups of four, each pupil within a group having been taught by a different method, and matched for sex, mental age, teacher's estimate of general ability, and score made in the preliminary test. The number of records available made it possible to match the individual pupils only roughly for chronological age. As a whole, however, the four resulting groups were rather closely balanced with respect to this trait. Altogether 112 of these matched "quartets" were formed, 53 composed

of girls and 59 of boys. This process resulted in four groups of 112 pupils each, a different method of instruction having been used with each group. These groups will be referred to as Groups A, B, C, and D, and the corresponding methods of instruction as Methods A, B, C, and D. Table I shows the mean mental and chronological age in months, the teachers' estimates of general ability, and the initial score for each of these groups.

It was planned to start the experiment when the pupils had mastered the combinations in addition and subtraction, the addition of three numbers of one digit each (as $2+2+3$), and the addition of four numbers of one digit each (as $4+2+2+1$), and before they

TABLE I

MEAN MENTAL AND CHRONOLOGICAL AGE IN MONTHS, TEACHERS' ESTIMATES OF GENERAL ABILITY, AND INITIAL SCORE IN PRELIMINARY TEST OF EACH OF FOUR GROUPS OF 112 SECOND-GRADE PUPILS

| Group | Mental Age | Chronological Age | Teachers' Estimate* | Initial Score |
|---|---|---|---|---|
| A | 100.5 | 96.2 | 2.7 | 25.7 |
| B | 100.6 | 97.2 | 2.4 | 27.9 |
| C | 100.8 | 96.7 | 2.4 | 26.3 |
| D | 100.8 | 95.7 | 2.5 | 26.2 |

* The means in this column were found by assigning values of 4, 3, 2, 1, and 0 to the teachers' letter marks of A, B, C, D, and F, respectively, and averaging in the usual way.

knew anything about the addition and subtraction of two- and three-place numbers. The training consisted in instruction and practice on three specific types of examples: (1) the addition of two numbers of two digits each (as $45+23$), (2) the addition of three numbers of two digits each (as $52+32+13$), and (3) the addition of a two-place number, a two-place number, and a one-place number in the order stated (as $24+23+2$).

The four methods of instruction were as follows: (1) In Method A the pupils were shown how to perform the process, and there was no generalization or consideration of underlying principles. For example, in teaching the pupils how to add a two-place number, a two-place number, and a one-place number, the teacher simply showed the pupils how to write and add these numbers. (2) In

Method B (generalization) the pupils were helped to formulate general methods of procedure from the specific types taught, and these generalizations were constantly emphasized throughout the teaching. In teaching the type of example cited for Method A, the teacher not only showed the pupils how to write the numbers but also helped them to form the generalization that the numbers must always be written in such a way as to keep the right-hand column straight. (3) In Method C (rationalization) the reasons and principles underlying the specific types taught were discussed with the pupils. The formulation of general rules of procedure was avoided as much as possible. In learning the type of example cited, the pupils discussed the principle that one's can only be added to one's and ten's to ten's, but nothing was said about keeping the right-hand column straight. (4) In Method D (generalization and rationalization) general methods of procedure were formulated, and the underlying principles were discussed. In the type of example previously used as an illustration the pupils were helped to form the conclusion that the right-hand column must be kept straight in order to add one's to one's and ten's to ten's.

All four groups were given the same series of tests. These were given four times: at the beginning and at the end of the experiment and twice during the experiment. In addition to the types of examples which the pupils had mastered before the beginning of the investigation and the three types which were taught during its course, these tests included the following types of examples:

ADDITION

| | | | |
|---|---|---|---|
| 24 | 274 | 526 | 242 |
| 22 | 213 | 221 | 222 |
| 22 | — | 132 | 322 |
| 11 | | — | 111 |
| — | | | — |
| 52 | 6 | 4 | 357 |
| 2 | 32 | 32 | 21 |
| 22 | 21 | 1 | — |
| — | — | — | |
| 24 | 235 | 6 | 54 |
| 322 | 3 | 342 | 322 |
| — | — | — | 2 |
| | | | — |

SUBTRACTION

| | | | | |
|---|---|---|---|---|
| 48 | 477 | 47 | 248 | 356 |
| 23 | 212 | 2 | 23 | 2 |

The examples that involved the proper placing of numbers having different numbers of digits were dictated to the pupils.

The experiment was carried on for twenty minutes a day for fifteen days, eight days being used for testing and seven days for instruction and practice. The complete time schedule was as follows:

First and second days: First test with the series of tests.

Third day: Instruction in the addition of two numbers of two digits each.

Fourth and fifth days: Practice in the types of examples taught on the third day.

Sixth and seventh days: Second test.

Eighth day: Instruction in the addition of three numbers of two digits each.

Ninth day: Practice in both types of examples previously taught.

Tenth and eleventh days: Third test.

Twelfth day: Instruction in the addition of a two-place number, a two-place number, and a one-place number presented in the order stated.

Thirteenth day: Practice in the three types of examples previously taught.

Fourteenth and fifteenth days: Fourth test.

## MEASURE OF TRANSFER

In order to ascertain whether the training that was given to the pupils on three types of examples had any effect on their ability to work the remaining types, the percentages of correct examples in the first and last tests for two of the untaught types of examples and for all the untaught types combined were found and are given in Table II.

The data in Table II show that the pupils worked 21.4 per cent of the untaught examples correctly in the first test and 73.8 per cent in the last test. This large improvement on the untaught types indicates that there was a considerable amount of transfer from the instruction and practice given in the three specific types that were taught. The percentage of maximum possible transfer was used as the measure of this transfer. This percentage was obtained by dividing the number of examples to which the effects of the specific

training spread by the total number to which it might have spread had the transfer been complete.

TABLE II

PERCENTAGE OF CORRECT EXAMPLES OF UNTAUGHT TYPES IN FIRST AND LAST TESTS

| Type of Example | First Test | Last Test |
|---|---|---|
| Addition of four two-place numbers | 35.3 | 87.7 |
| Addition of two three-place numbers | 36.3 | 93.5 |
| All untaught types | 21.4 | 73.8 |

The percentages of transfer shown by the final test are given in Table III for three types of examples and for all the untaught types combined.

TABLE III

PERCENTAGE OF TRANSFER SHOWN BY FINAL TEST

| Type of Example | Percentage of Transfer |
|---|---|
| Addition of four two-place numbers | 81.0 |
| Addition of two three-place numbers | 89.8 |
| Addition of one three-place number and one one-place number | 61.7 |
| All untaught types | 66.7 |

## COMPARISON OF METHODS OF TEACHING

The major purpose of this study was to determine whether it is possible to increase the percentage of transfer by the method of teaching. Specifically, the problem was to determine whether the transfer could be increased by generalization, rationalization, or generalization and rationalization combined. The mean percentage of transfer produced by each of the four different methods of instruction and the percentage of increase of each of the other methods over Method A are given in Table IV. The most important facts shown by the data in this table are (1) that the amount of transfer produced by Method B (generalization) was 21.5 per cent more than the transfer produced by Method A, (2) that the amount of transfer produced by Method C (rationalization) was only 5.4 per cent more than that produced by Method A, and (3) that the amount of trans-

fer produced by Method D (generalization and rationalization) was 20.5 per cent more than that produced by Method A.

In order to secure a measure of the reliability of these comparisons, the standard deviations of the differences and the ratios of these differences to their standard deviations were computed. The difference between the mean percentage of transfer produced by Method B and the mean percentage of transfer produced by Method A is 3.67 times the standard deviation of the difference ($3.67 \times S.D.D.$), that between Methods C and A is only 0.90 times the standard deviation of the difference ($0.90 \times S.D.D.$), and that between Methods D and A is 3.63 times the standard deviation of the difference ($3.63 \times S.D.D.$). It is customary to consider that any

TABLE IV

MEAN PERCENTAGE OF TRANSFER IN FINAL TEST AND PERCENTAGE OF INCREASE OVER METHOD A PRODUCED BY EACH METHOD OF INSTRUCTION

| Method | Mean Percentage of Transfer | Percentage of Increase over Method A |
|---|---|---|
| A | 59.6 | ..... |
| B | 72.4 | 21.5 |
| C | 62.8 | 5.4 |
| D | 71.8 | 20.5 |

difference equal to, or greater than, three times the standard deviation of the difference is practically certain to be significant. Accordingly, Methods B and D are almost certainly more effective than Method A in producing transfer, but there is probably no significant difference between Methods C and A.

In the comparison of the different methods of teaching, the transfer thus far considered has been that for all the different types of examples combined. It was found that the differences in the methods were much greater for those types of examples that involve the placing of numbers having different numbers of digits. Table V gives the mean percentage of transfer in the case of examples of this type. This table shows that, in the case of examples involving the placing of numbers having different numbers of digits, the amount of transfer produced by Method B (generalization) was 45.1 per cent more than that produced by Method A, that the amount of transfer

produced by Method C (rationalization) was 15.5 per cent more than that produced by Method A, and that the amount of transfer produced by Method D (generalization and rationalization) was 36.9 per cent more than that produced by Method A. The difference between the mean percentages of transfer produced by Methods B and A is 4.54 times the standard deviation of the difference ($4.54 \times S.D.D.$), that between Method C and A is 1.51 times the standard deviation of the difference ($1.51 \times S.D.D.$), and that between Methods D and A is 3.76 times the standard deviation of the difference ($3.76 \times S.D.D.$). Methods B and D are, therefore, almost certainly superior to Method A in producing transfer in the case of examples of this type, and Method C is possibly superior.

TABLE V

PERCENTAGE OF TRANSFER PRODUCED BY EACH METHOD OF INSTRUCTION IN THE CASE OF EXAMPLES INVOLVING THE PLACING OF NUMBERS HAVING DIFFERENT NUMBERS OF DIGITS

| Method | Mean Percentage of Transfer | Percentage of Increase over Method A |
|---|---|---|
| A | 46.6 | ..... |
| B | 67.6 | 45.1 |
| C | 53.8 | 15.5 |
| D | 63.8 | 36.9 |

## MINOR PROBLEMS STUDIED

The following minor problems were also investigated. (1) Are there sex differences in transfer? (2) Is there a relation between the amount of transfer and the mental ages of the pupils? (3) Is the loss that occurs in the transfer from the specific types of examples taught to the related types a function of the dissimilarity between the types? Because of lack of space it is impossible to give the results here. Those who are interested in these questions are referred to the complete report of this investigation.[1]

## SUMMARY OF RESULTS

The more important results of this investigation may be summarized as follows: (1) The effect of the instruction and practice

[1] J. R. Overman, *An Experimental Study of Certain Factors Affecting Transfer of Training in Arithmetic.* Baltimore: Warwick & York, Inc. (In press.)

given in certain specific types of examples was not confined to those types but spread to related types. For the group taught by the most favorable method, the mean transfer was 72.4 per cent of complete transfer, and the range of transfer was from 50.6 per cent to 92.9 per cent on different types of examples. (2) On the examples which involved the placing of addends having different numbers of digits Method B (generalization) increased the transfer by 45.1 per cent, Method C (rationalization) by 15.5 per cent, and Method D (generalization and rationalization) by 36.9 per cent.

## PEDAGOGICAL SIGNIFICANCE

This experiment was undertaken because the problem investigated was believed to be of fundamental importance in the teaching of arithmetic. It remains, therefore, to point out what seem to the writer to be the most important pedagogical implications of the results.

1. The results indicate that, while transfer from one type of example to a related type may occur in large amounts and may be complete in the case of some individuals, it is seldom complete for a group as a whole. This fact means that instruction and practice in the fundamentals of arithmetic must be based on full analyses of the fundamental processes. In view of the fact that transfer is seldom complete, all the essential facts and all the essential steps in the processes should be taught.

2. Although transfer from one type of example to other related types is possibly never complete, the results of this experiment show that it occurs in useful amounts—in amounts that we cannot afford to ignore.

3. The effectiveness of a given method of teaching in securing the immediate end sought is not the sole test of its worth. The methods of teaching the fundamentals of arithmetic should be those which will secure the maximum transfer to related types as well as the best mastery of the specific types taught. When the results of this experiment are considered, this fact means that, in addition to teaching any given type of example, we should help the pupils to use it as a basis for generalizing the process.

# READING DIFFICULTIES IN STUDYING CONTENT SUBJECTS

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The successful study of content subjects—such as history, geography, mathematics, and science—is conditioned largely by the ability to read effectively. Pupils who are retarded in reading are likely to be seriously handicapped in study activities. Pupils who are not retarded may encounter difficulties in performing certain reading activities. For example, a pupil may be able to interpret a passage in history intelligently but may have difficulty in selecting from the passage points which are pertinent to an assigned problem. Similarly, a pupil may have learned to read narrative materials satisfactorily but may not have learned to do the more intensive type of reading necessary to interpret a descriptive passage in mathematics. These two illustrations suggest that pupils who pursue content subjects effectively must be able to perform numerous kinds of reading activities. The study reported in this article was undertaken to determine the kinds of reading difficulties which pupils encounter in studying various junior high school subjects.

## TECHNIQUES EMPLOYED IN THE STUDY

The study was carried on in Grades VII and VIII of the Laboratory Schools of the University of Chicago during the school years 1926–27 and 1927–28. It consisted in careful analyses of the reading activities involved in the study of American history, mathematics, and general science. The general procedures employed in making the analyses included (1) visiting classes for a period of time sufficient to become thoroughly acquainted with the methods of teaching and the materials taught, (2) a careful study of the techniques of teaching and of the materials taught to determine the reading activities required, and (3) analyses of pupils' written reports and observations of pupils' study activities to identify their difficulties

in performing the reading activities. The following description of the methods employed in conducting the investigation in general science will illustrate the procedure.

*Techniques of instruction used in the class.*—The writer visited two classes continuously during the time devoted to five units of instruction. These visits continued for approximately five months. During the visits the writer made careful descriptive notes of the instructional procedures and collected samples of the materials assigned to the pupils.

A large part of the class time was devoted to directed study. During the periods of study each pupil worked more or less independently following directions given in a mimeographed work plan which the instructor provided. In general, the work plan consisted of three parts: (1) general directions with regard to study activities, (2) directions for a series of exercises designed to teach the essential points in the unit, and (3) a list of reference materials. After they had studied an exercise, the pupils prepared written reports, which were handed to the instructor for approval.

*Analysis of instructional materials.*—The following analysis indicates the reading activities connected with the study of a typical exercise.

In the study of a unit entitled "The Earth on Which We Live," the pupils were assigned the following problem: "How do the mean solar time and the standard time of a place five degrees west of Philadelphia compare with the mean solar and standard time at Philadelphia? (See Figure 25.)"[1] The pupils were expected to interpret the directions, to study the reference materials until they understood them, and to write a report showing their solution of the problem.

The following outline of the reading activities required by the exercise was made.

1. Interpretation of directions
   *a*) Comprehension of technical terms
   *b*) Recognition of problems involved

[1] The reference is to a figure in Charles John Pieper and Wilbur Lee Beauchamp, *Everyday Problems in Science*, Exercise 17, p. 32. Chicago: Scott, Foresman & Co., 1925.

2. Assimilation of discussion in textbook
   a) Securing an understanding of scientific concepts, such as mean solar time and standard time
   b) Securing an understanding of units of measurement
   c) Interpretation of the explanatory figure showing time belts of the United States
   d) Association of discussion in textbook with explanatory figure
3. Association of discussion in textbook with problem of the exercise
   a) Selection of points in discussion which are applicable to the problem
   b) Formulation of solution to the problem
4. Preparation of written report
   a) Organization of report
   b) Presentation of solution in written form
   c) Proofreading of report

An analysis of this kind provides a working basis for identifying reading difficulties. Frequently, after an analysis of this type had been made, it was necessary to revise it in the light of later observations of pupils' study procedures.

*Identification of pupils' difficulties.*—Since each pupil prepared written reports on the exercises, these reports furnished reactions to all phases of the units. By a comparison of the written reports with the work plans and with the assigned materials, it was possible to identify reading difficulties. During the school year 1926–27 the written reports for two units of the course were analyzed. However, this procedure was soon found to be only partially satisfactory for it was not always possible to determine the exact character of the pupils' difficulties from the written reports. Moreover, when the character of a difficulty was determined from a written report, the cause of the difficulty was still unknown. Consequently, it was necessary to revise the technique to include personal observations of the pupils during the study of the exercises. At the beginning of the school year 1927–28 the new technique was adopted. Careful descriptive notes of the observations were made. These notes contained descriptions of a pupil's study procedures, copies of his written reports, and statements of the observer's analysis of his difficulties. The observations varied in length from one to three class periods, depending on the time devoted to the study of an exercise by the pupil. The observations which are here reproduced consumed

the time of two class periods. The notes on the observations indicate the character of the technique employed in identifying the reading difficulties. The pupil was studying the exercise already described.

### Observations of a Pupil's Study Procedures

The pupil read the directions for the exercise. She then turned to the discussion in the textbook which accompanied it and began reading. After she had read a short time, she turned to Figure 25.

Observer: "Tell me what you are trying to find."

Pupil: "The time of a place five degrees west of Philadelphia."

Observer: "What time would that be?"

Pupil: "Fifteen minutes later."

Observer: "How do you know?"

Pupil: "It says fifteen degrees for one hour; it would be one-third of an hour."

Observer: "How many minutes in one-third of an hour?"

Pupil: "It would be more than fifteen minutes—thirty minutes—no, twenty minutes."

The pupil next began to prepare the written report of the exercise and wrote, "The time would be fifteen minutes later five degrees west of Philadelphia. If it is two o'clock in Philadelphia, it would be 2:20 five degrees west of Philadelphia." It was evident from this statement that she was encountering three difficulties: (1) She had not read the discussion in the textbook carefully enough to understand it fully. (2) She had not distinguished between mean solar time and standard time in interpreting the exercise. (3) She was still somewhat confused regarding the units of time measurement. The observer decided to lead her to recognize these difficulties.

Observer: "Read the statements which you have written."

Pupil: "Is there a mistake in English, or is it wrong?"

The observer pointed to the word "fifteen." The pupil recognized the error, drew a line through "fifteen" and wrote "twenty" above it.

Observer: "Read the directions for the exercise again."

Pupil: "I don't understand what that 'mean' word means—'mean solar time.'"

Observer: "Perhaps you had better look it up in your book."

The pupil re-read the discussion in the textbook and then pointed to a place five degrees west of Philadelphia in Figure 25.

Pupil: "The standard time would be the same here as at Philadelphia."

Observer: "Read the directions for the exercise carefully, and then explain what you are to do."

Pupil: "Compare the time at Philadelphia with the time five degrees west of Philadelphia."

Observer: "Your answer is partly correct; read the directions again, and find out exactly what you are told to do."

Pupil: "Compare the mean solar time at Philadelphia with the standard time five degrees west of Philadelphia."

Observer: "Read the directions once more."

Pupil: "Oh, I know! Compare the mean solar time and the standard time at Philadelphia with the mean solar time and the standard time of a place five degrees west of Philadelphia."

Observer: "Now finish the exercise."

The pupil read the discussion in the textbook again.

Pupil: "I know it is earlier here [pointing to Philadelphia on the map] and later here [pointing to a place five degrees west of Philadelphia], but these degrees—they mix me up."

The observer referred the pupil to a point in the textbook where the relation between longitude and time was explained. After she had read the explanation, she said that there would be a difference of twenty minutes in the time of the two places.

Pupil (a few minutes later): "Excuse me for interrupting, but I don't see how they can have two kinds of time at one place."

Observer: "Perhaps you had better get clearly in mind the difference between mean solar time and standard time."

The observer then discussed with the pupil these two terms. After the discussion the pupil completed the report on the exercise satisfactorily.

Observer: "What do you think caused your difficulty with this exercise?"

Pupil: "The two kinds of time mixed me up."

A comparison of the notes of this observation with the list of reading activities presented indicates that the pupil encountered difficulty with Steps 1 and 2. First, she attempted to interpret the directions before she had gained a sufficient understanding of the technical terms to interpret the directions. Second, she did not read the directions carefully enough to recognize the problem. Several re-readings were necessary before she recognized the problem. Finally, she attempted to prepare the report on the exercise before she fully understood the explanations in the textbook. When she first attempted to write the report, she understood neither the terms "mean solar time" and "standard time" nor the technical units of measurement involved in longitude and time. The pupil's reading ability was fair, but her use of that ability was inadequate because of her manner of attack in studying the exercise.

### READING DIFFICULTIES IN STUDYING AMERICAN HISTORY, MATHEMATICS, AND GENERAL SCIENCE

Analyses similar to the one just described were made in classes in American history, mathematics, and general science. These

analyses disclosed fifty reading difficulties. The classified list of the difficulties given in Table I shows that the difficulties were distributed among the various subjects as follows: thirteen occurred only in American history; sixteen occurred only in mathematics; twelve occurred only in general science; one was common to history, mathematics, and science; three were common to history and science; and four were common to mathematics and science. These data suggest that the difficulties were, for the most part, peculiar to the various subjects. However, an examination of the descriptive statements shows that some of the difficulties which occurred in only one subject might also have occurred in other subjects. For example, "Inability to interpret passage caused by lack of understanding of an abbreviation," which occurred only in mathematics, might have occurred in the study of other subjects. Nevertheless, many of the difficulties were peculiar to specific subjects. For example, "Inability to interpret illustrative exercise caused by lack of understanding of mathematical process used" was peculiar to mathematics and would not be likely to occur in either history or general science. Similarly, "Inability to interpret explanatory figure caused by lack of understanding of an essential scientific principle" was peculiar to science. Again, "Lack of critical reading shown by failure to discriminate between historical facts and mere probabilities" was peculiar to history.

Other difficulties grew out of the reading activities required by the teaching techniques employed in the classes. For example, "Inability to interpret mimeographed statement of minimal essentials in light of major problem of unit" arose from the character of the study helps supplied to the pupils in the history class. Similarly, "Confusion in following form for written work because directions admit of more than one interpretation" grew out of the character of the directions given to the pupils in general science. Furthermore, "Error in form of solution caused by misinterpretation of directions" was connected with a reading activity required by directions given in the class in mathematics. These difficulties were not caused by the nature of the subject matter but by the reading activities growing out of the techniques used by the teacher.

The reading difficulties listed in Table I are grouped into six

TABLE I

FIFTY READING DIFFICULTIES ENCOUNTERED BY PUPILS IN STUDYING AMERICAN HISTORY, MATHEMATICS, AND GENERAL SCIENCE CLASSIFIED ACCORDING TO UNDERLYING CAUSES

| Difficulty | American History | Mathematics | General Science |
|---|---|---|---|
| Reading difficulties growing out of pupils' methods of attack: | | | |
| Comprehension of only part of passage shown by omission of points of major importance | × | | |
| Inability to locate reference materials on a given problem | | | × |
| Failure to use given references in locating materials | × | | |
| Failure to use statement of minimal essentials as a guide to reading | × | | |
| Copying material from textbook without interpreting it | × | | |
| Failure to recognize problem caused by careless reading | × | | |
| Failure to select materials pertinent to problem caused by partial reading of assigned passage | × | | × |
| Use of previous knowledge instead of assigned passage in reacting to problem | × | | |
| Failure to understand instructional materials caused by superficial reading | | × | × |
| Misinterpretation of passage caused by lack of preciseness in reading | | × | |
| Inability to solve a mathematical exercise caused by failure to read accompanying illustrative solution | | × | |
| Mechanical following of directions without gaining understanding of mathematical process which directions are designed to teach | | × | |
| Mechanical reading of formulas without comprehending concrete ideas for which formulas stand | | × | |
| Misinterpretation of directions or exercises caused by mere failure (not inability) to associate directions with accompanying explanatory figures | | × | × |
| Misinterpretation of problem caused by overlooking significant word or expression | | × | × |
| Misinterpretation of mathematical exercise caused by failure to regard punctuation | | × | |
| Error in interpretation and solution of mathematical exercise caused by failure to read part of it | | × | |
| Overlooking errors in proofreading report | | | × |
| Meager understanding caused by skimming rapidly through material which should have been read intensively | | | × |
| Error in solution of exercise caused by carelessness in selecting items from a table | | | × |
| Formulation of title to exercise from sources other than exercise itself | | | × |
| Reading difficulties caused by inability to recognize relations: | | | |
| Failure to recognize relation of reference materials to problem | × | | × |
| Failure to discriminate between relevant and irrelevant material | × | | × |
| Inability to recognize relations among items in statement of minimal essentials | × | | |
| Inability to interpret mimeographed statement of minimal essentials in light of major problem of unit | × | | |
| Failure to recognize relative values shown by substitution of a general statement for specific points of importance | × | | |

TABLE I—*Continued*

| Difficulty | American History | Mathematics | General Science |
|---|---|---|---|
| Inability to associate descriptive material with accompanying mathematical figures | ..... | × | ..... |
| Misinterpretation of mathematical directions caused by inability to associate directions with accompanying explanatory figures | ..... | × | ..... |
| Misinterpretation of problem of exercise caused by failure to recognize relations among parts of the exercise | ..... | × | × |
| Inability to distinguish likenesses and differences in closely related scientific concepts | ..... | ..... | × |
| Inability to distinguish relative values shown by substitution of details for points of major importance | ..... | ..... | × |
| Formulation of conclusions not justified by facts at hand | ..... | ..... | × |
| Inability to recognize relations between a known series of facts and a problem based on the facts | ..... | ..... | × |
| Lack of critical reading shown by failure to discriminate between historical facts and mere probabilities | × | ..... | ..... |
| Reading difficulties arising from lack of knowledge of subject matter: | | | |
| Inability to interpret instructional material caused by failure to master preceding mathematical concepts | ..... | × | ..... |
| Inability to interpret illustrative exercise caused by lack of understanding of mathematical process used | ..... | × | ..... |
| Misinterpretation of exercise caused by inability to comprehend mathematical relations involved | ..... | × | ..... |
| Inability to detect errors in content of report caused by lack of understanding of fundamental instructional materials | ..... | ..... | × |
| Inability to interpret and execute directions because of failure to master a preceding mathematical process | ..... | × | ..... |
| Inability to interpret explanatory figure caused by lack of understanding of an essential scientific principle | ..... | ..... | × |
| Reading difficulties caused by deficiencies in vocabulary: | | | |
| Misunderstanding of instructional materials caused by misinterpretation of vocabulary | × | × | ..... |
| Inability to interpret instructional materials caused by lack of understanding of vocabulary | × | × | × |
| Misinterpretation of mathematical expression caused by applying incorrect meaning to symbol used | ..... | × | ..... |
| Misinterpretation of instructional materials caused by lack of understanding of abbreviations | ..... | × | ..... |
| Inability to interpret passage caused by lack of understanding of an abbreviation | ..... | × | ..... |
| Reading difficulties caused by inaccuracies: | | | |
| Misunderstanding of essential point in unit caused by inaccuracy in interpreting reference materials | × | ..... | ..... |
| Misreading technical words shown by errors in spelling | × | ..... | ..... |
| Error in form of solution caused by misinterpretation of directions | ..... | × | ..... |
| Reading difficulties arising from lack of clearness in directions given to pupils: | | | |
| Misinterpretation of problem caused by arrangement of directions | × | ..... | ..... |
| Confusion in following form for written work because directions admit of more than one interpretation | ..... | ..... | × |

categories on the basis of the underlying causes: (1) reading difficulties growing out of pupils' methods of attack, (2) reading difficulties caused by inability to recognize relations, (3) reading difficulties arising from lack of knowledge of subject matter, (4) reading difficulties caused by deficiencies in vocabulary, (5) reading difficulties caused by inaccuracies, and (6) reading difficulties arising from lack of clearness in directions given to pupils.

Reading difficulties growing out of pupils' methods of attack in studying were the most numerous; twenty-one difficulties were the result of carelessness or mere failure to perform the reading activities properly. In a few cases the pupils were unable to perform the activities because they used improper methods of attack. Such difficulties give evidence of poorly developed habits of study. It is significant that almost half the reading difficulties disclosed by this investigation belong in this category.

Thirteen reading difficulties were caused by inability to recognize relations. These difficulties constitute next to the longest list in the table. The reading activities in which these difficulties occurred involved to a large extent the so-called "higher thinking processes," such as association, discrimination, and reasoning. The reading activities required both the comprehension of reading materials and some use of the meaning derived from the materials. The difficulties in this group suggest the need for guidance in the processes of thinking which are essential to the performance of reading activities.

Six difficulties grew out of lack of understanding of the principles, processes, or facts requisite to the performance of reading activities. In such cases pupils were handicapped in interpretation by insufficient background of experience or by lack of a knowledge of the subject matter. These difficulties suggest the need for training in the practice of reviewing in order to secure information essential to the interpretation of new passages.

Five reading difficulties were caused by deficiencies in vocabulary. Difficulties with the vocabulary may result in the misinterpretation of a passage or in failure to attempt an interpretation. Difficulties in interpreting abbreviations and symbols are classified as difficulties caused by deficiencies in vocabulary. Reading difficulties caused by mere inaccuracy in performance were relatively few in number;

only three difficulties appear in this category. Reading difficulties arising from lack of clearness in directions were also few in number; only two difficulties were traced to this cause.

### SUMMARY AND INTERPRETATION

The reading difficulties identified by this investigation demonstrate the need for giving special attention to reading activities in connection with the teaching of each content subject. The reading activities required for the successful study of a subject depend on the techniques employed in teaching the subject and on the kinds of reading materials assigned. Therefore, pupils should be trained in the reading activities adapted to the demands of the subject. These conditions provide opportunity for developing many new reading skills. The performance of reading activities should be so guided that pupils may grow continually in reading ability as they advance through school. Both good and poor readers will profit from such guidance. The good reader will learn many new reading skills which will tend to increase the effectiveness of his study activities. The poor reader will not only gain new reading skills but will also receive assistance in overcoming other handicaps to his progress.

The causes underlying the reading difficulties suggest certain types of reading skills which may be developed in the junior high school: (1) Pupils may be trained in the methods of attack required by the reading activities. (2) Pupils may be trained to recognize relations and to perform the various forms of thinking required by the reading activities. (3) Pupils may be led to recognize shortcomings in their previous training and to adopt practices of review in order to secure information requisite to the understanding of new materials. (4) Pupils may be taught how to overcome difficulties with the vocabulary when they are encountered. (5) Pupils may be led to sense the necessity for accurate interpretation. Training to achieve these ends not only aids in improving reading ability but also assists in forming effective habits of study.

Guidance in reading should be recognized as a function of every instructor. It is generally assumed that an instructor is responsible for directing the study activities necessary to the successful pur-

suance of the course which he is teaching. When reading difficulties arise in the study of a subject, it is not unreasonable to expect an instructor to accept the responsibility for aiding pupils to overcome these difficulties. Such guidance is an essential phase of the instructional procedure in any course.

Effective guidance of study activities demands that an instructor be cognizant of the reading activities required by his course. The technique employed in this investigation suggests a direct approach to an understanding of the reading needs of pupils. This approach includes (1) analysis of the techniques of teaching and of the materials assigned for the purpose of determining the reading activities required, (2) identification of the pupils' difficulties in performing the reading activities, and (3) organization of a procedure of guidance adapted to the needs of the class. These three steps offer a practical basis for guidance in reading. They deal only with the reading activities which pupils actually use. They take no time from the regular work of a course. Many techniques for training in reading suggest special exercises which require time in addition to that spent on regular class activities. Such techniques frequently deal with hypothetical reading activities which may or may not be used in the study of the subject. The three steps mentioned in this paragraph eliminate the necessity for special reading exercises. Suggestions for organizing and applying guidance procedures will appear in a later article.

# DIFFICULTIES IN SOLVING PROBLEMS IN ARITHMETIC

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In recent years several studies of pupils' errors in solving arithmetic problems have been made. In these investigations two types of techniques have been used. One type consists in analyzing the results of group tests; the other, in observing individual pupils. This article reports a study in which the latter type of technique was used. The following problems were investigated: (1) What are the errors made by pupils in the intermediate grades in solving two-step arithmetic problems? (2) How do pupils in Grades IV, V, and VI differ in the types of errors which they make? (3) Do pupils from two schools show significant differences in the types of errors which they make?

## METHOD OF PROCEDURE

The method used was observation of the work of each pupil in a selected group as he solved orally a prepared list of problems. Each subject did the work with no one present but the examiner. Paper and pencil were provided, and the subjects were permitted to work mentally or on paper as they chose. In most cases thirty minutes was the limit of the period of work, not more than ten periods exceeding this limit. Two or three periods were required to complete the observation of each subject.

The problems, which had been typewritten on cards, were presented to the subject one at a time, and everything he said was recorded by the examiner. If long pauses indicated that the subject was not reporting his method fully, he was asked what he was thinking. The type of record secured is indicated by the following report of the way in which Problem 14 was solved by a fifth-grade pupil who was rated by his teacher as poor in arithmetic. The problem read as follows: "Chocolate bars can be bought 3 for 10c. How

much will 12 bars cost? How many could be bought for 50c?" After reading the problem, the subject said:

Let's see—3 for 10 cents—oh, multiply first. [Wrote $\frac{12}{48}$ and reported, when questioned, that he had obtained the 4 by dividing the 12 by 3.] This is hard. 48 cents, because I've taken care of the 3. No, I haven't. This isn't quite right because 9 can be bought for 30 cents, and 3 for 10, and 3 times 30—30 from 48 is 18. [Wrote 10 under the 48 and added, the sum being 58.] They'd cost 58 cents. [Wrote $\frac{30}{10}$.] That would be 40; 9 cost 30 and 3 more cost 10 is 40 cents. "How many could be bought for 50 cents?" [Read from the problem.] You'll divide. [Wrote $3\overline{)50}$.] You could divide it two different ways. [Wrote $10\overline{)50}$. Then divided $3\overline{)50}$, the quotient being 16 with a remainder of 2.] But that's 2 over. [Divided $10\overline{)50}$.] That gives 5, so it isn't right because I know already that 12 can be bought for 40 cents and this says 50. The answer must be 16 and 2 over.

An analysis of this record yields information regarding the subject's methods of reasoning which could not be obtained in any other way, although the technique is obviously subject to limitations.

### SUBJECTS OBSERVED

Records were secured in the manner described for sixty pupils in the University Elementary School of the University of Chicago and in a public school located nearby. These schools will be designated as School A and School B, respectively. The teachers of Grades IV, V, and VI in these schools were asked to select from their pupils five who did exceptionally good work in arithmetic and five who were among the poorest in the class. In School A the best pupils and the poorest pupils were taught by the same teacher in each grade, while in School B the best pupils and the poorest pupils were chosen from classes taught by different teachers.

### PROBLEMS USED

Fifteen arithmetic problems were used, each of which could be solved in two steps. The use of fractions in calculation was unnecessary, and decimals occurred only in problems involving money. The problems were so selected as to present all possible combinations of the four processes and to present a variety of situations requiring the use of each process. For example, the process of subtraction occurred as the first step in three problems, the second steps of which were, respectively, addition, multiplication, and division; it occurred

as the second step in three problems, the first steps of which were, respectively, addition, multiplication, and division; in a seventh problem it was necessary to use subtraction as both first and second steps in the solution. Thus, the process of subtraction would be used eight times if all the problems were solved correctly and by the methods most likely to be used. Of the eight situations in which subtraction was needed, two involved its use in making change, three involved the idea of finding a remainder, and three involved the notion of comparison. The other three processes were treated similarly, each process, with the exception of addition, occurring eight times. Since two-step problems demanding two additions for their solution do not occur, addition was included only in combination with other processes.

The problems are given in the following paragraphs. The number preceding each problem indicates its order in the logical sequence already described, while the number in parentheses following it indicates its place in the series as presented to the subjects.

1. Henry eats his lunch in the school lunchroom. Today he had potatoes, beets, bread, butter, milk, and an apple. The potatoes cost 8c, beets 10c, bread 2c, butter 3c, milk 5c, and the apple 5c. He gave the cashier a half-dollar. How much change should he have received? (1)

2. The Girl Scouts had a candy sale. Mary brought a plate of candy containing 20 pieces, Helen brought 25 pieces, and Jane brought 17 pieces. If they sold the candy at 2c a piece, how much money did they get for the candy the three girls brought? (8)

3. The Jones family took a trip in their car. They drove 214 miles the first day, 273 miles the second day, and 185 miles the third day. What was their average for the three days? (4)

4. On July 1, Joseph weighed 65 pounds; on August 1, he weighed 68 pounds. If he continued to gain at this rate, how much did he weigh on September 1? (13)

5. Bill was saving money to buy a pair of skates which cost $7.50. He still needed $1.15, when there was a sale and he found he could get the kind he wanted for $5.95. How much did he have left after buying the skates? (2)

6. The lunch counter sells apples. In the last box there were 140 apples. Six of them spoiled, and the rest were sold at 5c each. How much money was received for the apples? (9)

7. In 1910 the population of Illinois was 5,638,591. In 1920 it was 6,458,280. What was the average yearly increase during this ten-year period? (6)

8. Harold went to the grocery store for his mother. He bought 2 cans of

peas at 19c a can, 2 loaves of bread at 10c each, and a package of crackers for 17c. How much money did he spend? (14)

9. How much would one save in a year by subscribing to a monthly magazine for $2.75 a year instead of buying single copies for 25c a copy? (7)

10. A man earns 85c an hour. If he works 8 hours a day, how much money will he earn in a month which has 27 working days? (3)

11. A candy store sells candy in trial bags which contain about 3 ounces. How many such bags can be filled from a five-pound box of candy? (There are 16 ounces in a pound.) (11)

12. The Boy Scouts estimated that the supplies for ten boys who were going on a camping trip would cost $60.00. The railroad fare was $1.74 apiece for the round trip. If their estimate was correct, how much did each boy pay for supplies and railroad fare? (15)

13. The Lincoln School has a square garden. The fourth-grade children planted sweet peas along one side, and the boys are going to put up a wire for the vines to climb. The janitor told them that the fence around the garden was 104 feet long and that they had better leave a space 2 feet wide for a path down the middle of the garden. How much wire will they need? (5)

14. Chocolate bars can be bought 3 for 10c. How much will 12 bars cost? How many can be bought for 50c? (10)

15. Mr. Brown's yearly income is $3,000. He wishes to save one-fifth of it. How much must he save each month on the average? (12)

## RESULTS OF TESTS

The average number of problems solved correctly by the good pupils and the poor pupils in each grade in School A and in School B are shown in Table I, which should be read as follows: The good pupils in Grade IV in School A solved an average of 5.8 problems correctly; those in School B solved an average of 3.4 problems correctly. The poor pupils in Grade IV in School A solved an average of 1.2 problems correctly; those in School B solved an average of 1.4 problems correctly. Comparison of the averages for the good pupils shows that the averages for School A are consistently higher than the averages for School B; however, only one of the differences is large enough to be statistically significant. Comparison of the averages for the poor pupils shows slightly higher averages for School B in Grades IV and VI and a higher average for School A in Grade V. None of these differences is sufficiently large to be of certain significance statistically. In School A the averages for the good pupils are higher in all grades than are those for the poor pupils, while in School B there is a slight but insignificant difference in favor of the

poor pupils in Grade V. In School A the increase in the number of problems solved correctly is largest between Grades IV and V, while in School B the most marked increase is between Grades V and VI.

### TYPES AND FREQUENCY OF ERRORS

The record of the methods used by each subject was studied, and each error or peculiar method was tabulated. The errors were classified in four groups: errors in reasoning, errors in fundamentals, errors in reading, and miscellaneous errors. The last classification included errors impossible to classify in one of the other groups.

TABLE I

AVERAGE NUMBER OF PROBLEMS SOLVED CORRECTLY BY GOOD PUPILS AND BY POOR PUPILS IN GRADES IV, V, AND VI IN SCHOOL A AND IN SCHOOL B

| Grade | School A | School B | Both Schools |
|---|---|---|---|
| Good pupils: | | | |
| IV | 5.8 | 3.4 | 4.6 |
| V | 10.2 | 4.4 | 7.3 |
| VI | 12.4 | 10.2 | 11.3 |
| Poor pupils: | | | |
| IV | 1.2 | 1.4 | 1.3 |
| V | 8.8 | 4.8 | 6.8 |
| VI | 8.2 | 8.8 | 8.5 |

Errors in reasoning were indicated by the letter "R" prefixed to an index number; errors in fundamentals, by "F"; errors in reading, by "L"; and miscellaneous errors, by "M." The index number and a description of the errors included under each head are given in the following paragraphs.

*R–1. Use of a wrong process.*—Subjects frequently added two numbers which they should have subtracted, or they multiplied two numbers when the situation required division. Such errors were classified as the use of the wrong process. In order that the mistake might be definitely identified, these errors were separated into the following subdivisions: (*a*) use of subtraction for addition, (*b*) use of multiplication for addition, (*c*) use of addition for subtraction, (*d*) use of multiplication for subtraction, (*e*) use of division for subtraction, (*f*) use of addition for multiplication, (*g*) use of subtraction for multiplication, (*h*) use of division for multiplication, (*i*) use of addi-

tion for division, (*j*) use of subtraction for division, and (*k*) use of multiplication for division.

*R–2. Disregard of a significant fact stated in the problem.*—Some subjects ignored completely a fact which was necessary for the correct solution of a problem. For example, in working Problem 5, some subjects did not take into consideration the fact that "Bill still needed $1.15," their method of solution being to subtract $5.95 from $7.50.

*R–3. Using together numbers not directly related.*—Subjects sometimes failed to grasp the relations of the various data in a problem and attempted to solve the problem by using together numbers which were related only indirectly. In solving Problem 9, many subjects used 25 cents with $2.75, ignoring the fact that, since one was the monthly cost and the other the annual cost, the two could be compared only after one had been multiplied, or the other divided, by 12.

*R–4. Disregard of a fact to be supplied.*—Three of the problems in the list—Problems 9, 13, and 15—required the use of known facts for their solution. In the case of Problem 13 it was necessary for the subject to know and use the fact that a square has four equal sides, while the solution of Problems 9 and 15 required the subject to supply the fact that there are twelve months in a year. In each case these facts were ignored by some subjects, who attempted to solve the problems without supplying the facts.

*R–5. Hesitation in selecting the method of solution.*—Some subjects apparently selected the processes to be used almost automatically, even when incorrect processes were selected. Other subjects hesitated a considerable length of time before selecting the process. The latter type of behavior was classified as hesitation in selecting the method of solution.

*R–6. Use of a method longer than that necessary.*—In some instances subjects arrived at correct results by methods which involved one or more extra steps. For example, in solving Problem 2, some subjects multiplied each of the number of pieces by 2 cents and then added the products, whereas they could have added first and performed only one multiplication.

*R–7. Confusion in method.*—Some subjects used methods which indicated that they had no clear idea of the relation of the data given

in a problem. For example, in solving Problem 12, one subject multiplied $1.74 by 10, subtracted the product from $60.00, divided by 10, and then added $1.74 to the quotient. Errors of this sort, although not all were identical, were classed as confusion in method.

*R–8. Selection of a process, or justification of a selection, by the numbers or by the types of numbers in a problem.*—Some children apparently were guided in selecting the process to be used by the numbers in the problem. For example, more than two numbers to them indicated addition, while a large and a small number indicated multiplication or division and never addition or subtraction.

*R–9. Use of an irrelevant fact.*—Subjects sometimes attempted to use a fact given in the problem, or one which they supplied, which was not relevant to the solution. One subject, in solving Problem 4, used the fact that there are thirty-one days in a month.

*R–10. Combining unlike quantities.*—Some subjects made the error of adding or subtracting numbers representing such quantities as pieces of candy and amounts of money.

*R–11. Interpreting fractions as indications of error.*—Some subjects thought that a fraction in an answer indicated that an error had been made in the solution.

*R–12. Omission of an item.*—In solving Problems 1 and 2, in which there were series of numbers to be added, an item was sometimes omitted.

*R–13. Failure to complete a solution.*—In solving Problem 4, some subjects found the amount of weight gained but did not perform the addition necessary to complete the solution. Since all the data in the problem were used, such an error was classified as failure to complete the solution.

*R–14. Confusing quantities.*—Some subjects showed confusion as to whether the results of their calculations were money or candy in Problem 2 or bags or ounces in Problem 11.

*R–15. Confusing two numbers.*—Sometimes one number was used in place of another. For example, in solving Problem 6, a subject used 5 as the number of apples spoiled as well as the price at which each apple was sold. In solving Problem 11, a subject interchanged the 3 and the 5.

*R–16. Reversal of the order of operations.*—Sometimes the nec-

essary operations were performed in reverse order, an error thus being introduced into the solution. For example, in solving Problem 12, in which $60.00 must be divided by 10 and $1.74 must be added to the quotient, one subject added $1.74 to $60.00 before he divided.

*R–17. Including items not given.*—In solving Problem 8, two subjects included some items twice.

*R–18. Selection of a method by analogous problem.*—One subject said he always solved his problems by imagining a similar situation with small numbers and transferring the method to the problem in question. Another subject selected her process for finding average distance according to the method used in the schoolroom for finding average marks.

*F–1. Error in calculation.*—Errors in calculation were subdivided into the following classes: (*a*) errors in addition, (*b*) errors in subtraction, (*c*) errors in multiplication, (*d*) errors in division, (*e*) errors in the use of a remainder, (*f*) errors in calculations with fractions, and (*g*) errors in placing decimal points.

*F–2. Use of a roundabout method of calculation.*—Occasionally roundabout methods of calculation were used. An instance of this error appeared in the work of a subject who solved the first part of Problem 14 by saying, "3 for 10 cents, 6 will be 20 cents, 9 for 30 cents, 12 for 40 cents."

*F–3. Incorrect arrangement of work.*—Errors in calculation were sometimes caused by faulty arrangements of the numbers. For exple, a subject arranged the numbers to be added in Problem 1 as follows:

8
10
2
3
5
5

$2.40

*F–4. Failure to attempt multiplication or division.*—Some fourth-grade children recognized the need for multiplication or division in certain problems but said that they were unable to perform the calculations.

*F–5. Inability to interpret a fraction.*—Some subjects were unable to interpret the fraction "one-fifth" in Problem 15.

*F–6. Attempt to subtract three numbers.*—In solving Problem 5, two subjects recognized the need for subtraction but wrote all three numbers in a column and attempted to subtract.

*L–1. Re-reading the problem.*—It was necessary for some subjects to re-read all or part of a problem after the first reading. Re-reading does not include merely looking back at the problem to copy the numbers.

*L–2. Difficulty with the vocabulary.*—Some subjects asked the meaning of certain words or in other ways gave evidence that the words were unfamiliar. In such cases the difficulty was classified as a difficulty with the vocabulary. In other instances the subjects did not apply the meaning of certain words in solving the problems but gave no other evidence that the words were unfamiliar. Because of the difficulty of distinguishing between errors caused by genuine deficiencies in vocabulary and errors caused by careless reading, errors made by pupils who gave no evidence that words were unfamiliar were not classed as difficulties with the vocabulary.

*L–3. Obvious misunderstanding of the situation.*—Some subjects evidently read into a problem a meaning different from the meaning intended. This occurred most often in connection with Problem 12, the $60 being interpreted to include both supplies and railroad fare.

*L–4. Significant error or omission in reading.*—Only errors or omissions which proved to be genuine errors in reading rather than slips of the tongue made while the correct meaning was comprehended were included in this classification. An instance of an important omission occurred in the case of a subject who, in reading, omitted the last two sentences of Problem 1. When he solved the problem, he found only the total cost of the articles of food; he had apparently ignored the last part when he read the problem.

*L–5. Error in reading the answer.*—Some subjects read incorrect answers although inspection of their written work showed that they had secured correct answers.

*L–6. Confusion caused by the use of parentheses.*—Two subjects were confused and hindered in their reasoning by the sentence in parentheses at the end of Problem 11.

*M–1. Failure to appreciate the absurdity of an impossible answer.*—Some subjects made errors which caused absurd answers, but they apparently failed to see the absurdities.

*M–2. Failure to make an attempt to solve a problem.*—Some pupils said that they could not solve a problem as soon as they had read it.

*M–3. Giving up the attempt to solve a problem.*—Some subjects became convinced, after attempting to solve a problem, that they were unable to do so and went on to another problem without completing the solution.

*M–4. Incorrect phrasing of the method.*—Occasionally a subject said he was going to use a certain method but actually used another. When questioned about the change, he said that he had intended to use the method which he did use.

*M–5. Use of a wrong value for, or uncertainty with regard to, quantities to be supplied.*—The use of a wrong value occurred most often in solutions of Problem 4, some subjects not being sure of the order of the months.

*M–6. Neglect of one of the two questions stated in the problem.*—Several subjects neglected to answer one of the questions in Problem 14.

*M–7. Error or omission in copying numbers.*—Some mistakes were made in copying the numbers from a problem.

*M–8. Error in calculation because of illegible figures.*—Three subjects misread the figures they had written.

*M–9. Estimation of an answer without calculation.*—Two subjects gave answers which they considered reasonable without calculating to determine the exact answers.

*M–10. Error in writing an answer.*—One subject made a mistake in writing his answer although he gave the correct answer orally.

The number of pupils who made errors of each type are given by grade and school in Table II, which shows the number of pupils making each error once or oftener during the process of solving all fifteen problems. This table should be read as follows: Error R–1*a* (use of subtraction for addition) was made by three pupils in Grade IV in School A and by one pupil in Grade IV in School B; it was made by three pupils in Grade V in School A and by none in Grade V in School B; it was made by two pupils in Grade VI in School A

## TABLE II

NUMBER OF PUPILS WHO MADE EACH ERROR ONCE OR OFTENER IN GRADES IV, V, AND VI IN SCHOOL A AND IN SCHOOL B

| ERROR | GRADE IV | | GRADE V | | GRADE VI | | TOTAL | | TOTAL IN BOTH SCHOOLS |
|---|---|---|---|---|---|---|---|---|---|
| | School A | School B | School A | School B | School A | School B | School A | School B | |
| R–1*a* | 3 | 1 | 3 | 0 | 2 | 3 | 8 | 4 | 12 |
| R–1*b* | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 2 | 2 |
| R–1*c* | 3 | 6 | 1 | 6 | 0 | 2 | 4 | 14 | 18 |
| R–1*d* | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 1 |
| R–1*e* | 0 | 4 | 0 | 0 | 0 | 1 | 0 | 5 | 5 |
| R–1*f* | 2 | 2 | 0 | 2 | 0 | 0 | 2 | 4 | 6 |
| R–1*g* | 1 | 1 | 0 | 0 | 0 | 0 | 1 | 1 | 2 |
| R–1*h* | 1 | 5 | 1 | 4 | 0 | 0 | 2 | 9 | 11 |
| R–1*i* | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 |
| R–1*j* | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 |
| R–1*k* | 2 | 6 | 0 | 1 | 0 | 4 | 2 | 11 | 13 |
| Total (R–1) | 14 | 27 | 5 | 13 | 2 | 11 | 21 | 51 | 72 |
| R–2 | 10 | 10 | 8 | 9 | 7 | 10 | 25 | 29 | 54 |
| R–3 | 8 | 10 | 8 | 9 | 8 | 9 | 24 | 28 | 52 |
| R–4 | 7 | 10 | 5 | 9 | 7 | 8 | 19 | 27 | 46 |
| R–5 | 7 | 9 | 5 | 7 | 5 | 9 | 17 | 25 | 42 |
| R–6 | 5 | 4 | 10 | 3 | 3 | 4 | 18 | 11 | 29 |
| R–7 | 7 | 3 | 5 | 3 | 2 | 2 | 14 | 8 | 22 |
| R–8 | 0 | 7 | 0 | 4 | 0 | 0 | 0 | 11 | 11 |
| R–9 | 0 | 2 | 0 | 4 | 0 | 2 | 0 | 8 | 8 |
| R–10 | 3 | 3 | 0 | 2 | 0 | 0 | 3 | 5 | 8 |
| R–11 | 0 | 1 | 5 | 0 | 0 | 1 | 5 | 2 | 7 |
| R–12 | 0 | 1 | 1 | 3 | 1 | 1 | 2 | 5 | 7 |
| R–13 | 1 | 0 | 3 | 1 | 0 | 1 | 4 | 2 | 6 |
| R–14 | 2 | 1 | 0 | 1 | 1 | 1 | 3 | 3 | 6 |
| R–15 | 1 | 0 | 1 | 1 | 2 | 0 | 4 | 1 | 5 |
| R–16 | 0 | 1 | 1 | 2 | 0 | 0 | 1 | 3 | 4 |
| R–17 | 1 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 2 |
| R–18 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 2 | 2 |
| Total* | 66 | 89 | 57 | 71 | 38 | 62 | 161 | 222 | 383 |
| F–1*a* | 8 | 1 | 0 | 5 | 2 | 2 | 10 | 8 | 18 |
| F–1*b* | 6 | 4 | 6 | 6 | 6 | 2 | 18 | 12 | 30 |
| F–1*c* | 7 | 4 | 6 | 4 | 7 | 3 | 20 | 11 | 31 |
| F–1*d* | 1 | 3 | 4 | 4 | 1 | 4 | 6 | 11 | 17 |
| F–1*e* | 0 | 2 | 1 | 2 | 1 | 0 | 2 | 4 | 6 |
| F–1*f* | 0 | 0 | 3 | 1 | 0 | 1 | 3 | 2 | 5 |
| F–1*g* | 3 | 5 | 2 | 3 | 1 | 2 | 6 | 10 | 16 |
| Total (F–1) | 25 | 19 | 22 | 25 | 18 | 14 | 65 | 58 | 123 |
| F–2 | 6 | 4 | 1 | 5 | 2 | 4 | 9 | 13 | 22 |
| F–3 | 2 | 2 | 0 | 1 | 0 | 0 | 2 | 3 | 5 |
| F–4 | 4 | 0 | 0 | 0 | 0 | 0 | 4 | 0 | 4 |
| F–5 | 2 | 2 | 0 | 0 | 0 | 0 | 2 | 2 | 4 |
| F–6 | 2 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 2 |
| Total* | 41 | 27 | 23 | 31 | 20 | 18 | 84 | 76 | 160 |

* The totals of the subdivisions R–1 and F–1 must not be included in computing the totals of these two classifications.

TABLE II—*Continued*

| Error | Grade IV | | Grade V | | Grade VI | | Total | | Total in Both Schools |
|---|---|---|---|---|---|---|---|---|---|
| | School A | School B | School A | School B | School A | School B | School A | School B | |
| L–1 | 7 | 7 | 4 | 6 | 7 | 6 | 18 | 19 | 37 |
| L–2 | 6 | 8 | 4 | 4 | 2 | 3 | 12 | 15 | 27 |
| L–3 | 0 | 0 | 4 | 1 | 2 | 3 | 6 | 4 | 10 |
| L–4 | 4 | 1 | 0 | 2 | 0 | 0 | 4 | 3 | 7 |
| L–5 | 0 | 0 | 2 | 1 | 0 | 0 | 2 | 1 | 3 |
| L–6 | 0 | 0 | 0 | 2 | 0 | 0 | 0 | 2 | 2 |
| Total | 17 | 16 | 14 | 16 | 11 | 12 | 42 | 44 | 86 |
| M–1 | 1 | 7 | 1 | 5 | 0 | 1 | 2 | 13 | 15 |
| M–2 | 5 | 1 | 3 | 0 | 0 | 2 | 8 | 3 | 11 |
| M–3 | 2 | 5 | 1 | 0 | 0 | 1 | 3 | 6 | 9 |
| M–4 | 0 | 1 | 2 | 1 | 2 | 3 | 4 | 5 | 9 |
| M–5 | 4 | 2 | 0 | 0 | 1 | 0 | 5 | 2 | 7 |
| M–6 | 1 | 3 | 0 | 3 | 0 | 0 | 1 | 6 | 7 |
| M–7 | 1 | 1 | 1 | 2 | 0 | 0 | 2 | 3 | 5 |
| M–8 | 0 | 0 | 1 | 1 | 0 | 1 | 1 | 2 | 3 |
| M–9 | 1 | 0 | 0 | 1 | 0 | 0 | 1 | 1 | 2 |
| M–10 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 |
| Total | 16 | 20 | 9 | 13 | 3 | 8 | 28 | 41 | 69 |
| Grand total | 140 | 152 | 103 | 131 | 72 | 100 | 315 | 383 | 698 |

and by three pupils in Grade VI in School B. Eight pupils in School A and four in School B made this error, a total of twelve in both schools.

The totals given in the last column of the table show that the errors made by the largest number of pupils were errors of reasoning, a total of 383 pupils having made errors of this kind. The group with the second highest frequency is that of errors in fundamentals; a total of 160 pupils made errors of this classification. Errors in reading are third, and the miscellaneous errors have the smallest frequency. The same order holds in each of the three grades, with the exception of Grade IV, in which more pupils made miscellaneous errors than made errors in reading.

The variation in the number of subjects who made errors in the eleven subdivisions of Error R–1 (use of a wrong process) is interesting. Twelve subjects used subtraction for addition (R–1*a*), while only two subjects used multiplication for addition (R–1*b*), and division was never used in place of addition. Eighteen subjects used addition for subtraction (R–1*c*), while only one subject used multiplication for subtraction (R–1*d*) and five subjects used division for

subtraction (R–1*e*). Six subjects used addition for multiplication (R–1*f*); two subjects used subtraction for multiplication (R–1*g*); and eleven subjects used division for multiplication (R–1*h*). Only one subject used each of the processes of addition and subtraction for division (R–1*i* and R–1*j*), while thirteen subjects used multiplication for division (R–1*k*). These facts indicate that the error made by most subjects in selecting the process required in a given situation was to use the process which is the reverse of the one required, namely, subtraction for addition, addition for subtraction, division for multiplication, and multiplication for division. The second most common error was to use the process which, when applied to integers, has an effect similar to that required. For example, multiplication was used in place of addition, both being processes which tend, when applied to integers, to yield results larger than the numbers involved; or division was used in place of subtraction, both processes yielding results smaller than the minuend or dividend. The error made least often was to use a process which is neither the reverse operation nor the operation giving similar results, such as addition for division.

In the subdivisions of Error F–1 (error in calculation) the processes in which errors were made by most subjects are subtraction (F–1*b*) and multiplication (F–1*c*). More subjects made errors in addition (F–1*a*) than made errors in division (F–1*d*). These facts, however, cannot be interpreted as indicating the relative ability of the subjects in each of the fundamental operations because errors in reasoning and eccentric methods of calculating frequently changed significantly the number of opportunities for errors in performing each operation in spite of the fact that the correct solution of the problems required the use of each of the processes of multiplication, subtraction, and division eight times and the use of the process of addition six times.

Comparison of the totals for each error in each grade fails to show a consistent decrease from grade to grade. When the total frequencies for a group of errors are compared, however, the decrease is evident for each group.

Comparison of the totals for School A and for School B show that subjects in School A made fewer errors than subjects in School B

in each of the three grades. Fewer errors in reasoning were made by subjects in School A than by subjects in School B. In fundamentals, however, more errors were made by subjects in School A than by subjects in School B in Grades IV and VI, while in Grade V more errors were made by subjects in School B. This situation may be explained by the fact that many of the pupils in School B followed the habit of checking their calculations as they were required to do in their regular work. In Grade IV more errors in reading were made by subjects in School A than were made by subjects in the same grade in School B, but in the other grades more errors of this type were made by subjects in School B.

Another interesting aspect of the difference between the two schools is the fact that some errors occurred in the work of subjects from only one of the schools. In most of the cases of this sort the errors were made by very few subjects. Eleven subjects in School B made Error R–8 (selection of a process, or justification of a selection, by the numbers or by the types of numbers in a problem), while no subjects in School A made this error. This difference may possibly be explained by the fact that it was the policy in School A to teach the fundamental operations largely by means of problems rather than by means of drill exercises. The superiority in reasoning of the pupils in School A may perhaps be explained on the same ground.

## CONCLUSION

Analysis of the work of the sixty subjects studied revealed errors of forty types. It was found that, while the number of pupils who made a particular error did not always decrease from one grade to the next, the totals for a group of errors and for all errors did show such decreases. Significant differences in the results for the two schools were noted, some of which may perhaps be explained by the use of problem material for teaching the fundamental processes in School A and by the emphasis placed on the checking of calculations in School B.

# IMPROVING ABILITY IN CAPITALIZATION

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During the school year 1929–30 Ruth Moore undertook, under the writer's direction, a series of remedial projects in the mechanics of written English with sixth-grade pupils in the Fairfield Township Centralized School, Butler County, Ohio. The procedure utilized and the results attained in improving the ability to capitalize are reported in this article. The total amount of time spent on the unit in capitalization amounted to seventeen and one-half hours. Fifteen

TABLE I

SCORES OF THIRTY-FOUR SIXTH-GRADE PUPILS ON PRELIMINARY TEST IN CAPITALIZATION

| Pupil | Score | Pupil | Score | Pupil | Score |
|---|---|---|---|---|---|
| 1 | 119 | 13 | 85 | 25 | 74 |
| 2 | 98 | 14 | 84 | 26 | 70 |
| 3 | 98 | 15 | 84 | 27 | 70 |
| 4 | 95 | 16 | 83 | 28 | 69 |
| 5 | 93 | 17 | 83 | 29 | 68 |
| 6 | 92 | 18 | 82 | 30 | 68 |
| 7 | 91 | 19 | 81 | 31 | 68 |
| 8 | 89 | 20 | 79 | 32 | 63 |
| 9 | 88 | 21 | 77 | 33 | 36 |
| 10 | 88 | 22 | 76 | 34 | 20 |
| 11 | 87 | 23 | 75 | | |
| 12 | 85 | 24 | 74 | Median | 82.5 |

minutes a school day were devoted to the work for a period of fourteen weeks.

Discovering the pupils who were weak in capitalization constituted the first step in the project. For this purpose the Guiler-Henry Preliminary Diagnostic Test in Capitalization was used, covering thirty specific uses of capital letters, each of which is measured two or more times. Each test item has a value of one point, and the highest possible score is 129 points. The particular usages included in the test are shown in Table III. The scores of the thirty-four pupils tested in the preliminary survey are shown in Table I.

An examination of Table I in the light of the grade standards presented in Table II reveals a number of salient facts. First, the sixth-grade pupils ranked slightly below the standard for their grade. Second, there was marked variation in achievement; the score of the best pupil was approximately six times that of the poorest pupil. Third, many of the pupils manifested outstanding ability in capitalization. The seventh-grade standard or better was attained by ten pupils; the eighth-grade standard, by four pupils; the ninth-grade standard, by three pupils; and the twelfth-grade standard, by one pupil. Fourth, many of the pupils exhibited marked weaknesses in capitalization.

TABLE II

GRADE STANDARDS FOR PRELIMINARY TEST IN CAPITALIZATION

| Grade | Standard Score |
|---|---|
| VI | 84 |
| VII | 88 |
| VIII | 94 |
| IX | 96 |
| X | 100 |
| XI | 104 |
| XII | 108 |

Diagnosing and recording the specific shortcomings of the nineteen pupils who fell below the grade standard constituted the second and third steps, respectively, in the remedial program. Individual weaknesses were discovered by an analysis of the errors found in the pupils' test papers, and a diagnostic chart was made showing the weaknesses of each pupil. Table III contains a limited sampling of the individual learning needs which were revealed by the study of errors. Three types of data are presented in Table III: (1) the specific usages measured by the preliminary test, (2) the usages with which difficulty was encountered by certain pupils, and (3) the error quotients. The error quotients for the retest have no special significance at this point, but they will be referred to later. The idea of using error quotients as a measure of mastery seems to have originated with Stormzand and O'Shea, who state that these quotients are "determined by using the frequencies of error for an indi-

## TABLE III

USES OF CAPITAL LETTERS IN WHICH DIFFICULTIES WERE ENCOUNTERED BY TEN SIXTH-GRADE PUPILS WHO FELL BELOW THE GRADE STANDARD AND ERROR QUOTIENTS FOR THIRTY-FOUR PUPILS ON PRELIMINARY AND FINAL TESTS

| USE OF CAPITAL LETTER IN WHICH DIFFICULTY WAS ENCOUNTERED | PUPIL | | | | | | | | | | ERROR QUOTIENT | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 16 | 18 | 20 | 22 | 24 | 26 | 28 | 30 | 32 | 34 | Preliminary Test | Final Test |
| Use of capital letters for— | | | | | | | | | | | | |
| 1. "Whereas" and "Resolved" and first word following each in formal resolutions | X | X | X | X | X | X | X | X | X | X | .981 | .158 |
| 2. Names of notable historical periods | X | X | X | X | X | X | X | X | X | X | .947 | .105 |
| 3. Abstract words strongly personified | X | X | X | X | X | X | X | X | X | X | .921 | .237 |
| 4. Names of notable historical events | X | X | X | X | X | X | X | X | X | X | .877 | .421 |
| 5. Names of notable historical movements | X | X | X | X | X | X | X | X | X | X | .842 | .605 |
| 6. First and important words in a title | X | X | X | X | X | X | X | X | X | X | .825 | .298 |
| 7. Letter *O* when used with nouns in direct address | X | X | X | X | .. | X | .. | X | X | X | .763 | .079 |
| 8. Words derived from the names of particular places and things | .. | X | X | X | X | X | X | X | X | X | .719 | .158 |
| 9. Names of all sacred books | X | X | X | .. | X | X | X | X | X | X | .684 | .333 |
| 10. Words derived from names of persons | X | X | X | X | X | X | X | X | .. | X | .658 | .079 |
| 11. Names of groups of persons and organizations | .. | X | X | .. | X | X | X | X | X | X | .579 | .246 |
| 12. Names of days of special observance | .. | .. | X | X | X | X | X | X | X | X | .474 | .140 |
| 13. First word of every line of poetry | X | X | X | .. | .. | .. | X | .. | X | X | .461 | .000 |
| 14. Degrees and abbreviated titles following a name | .. | X | X | .. | .. | .. | .. | X | .. | X | .447 | .079 |
| 15. The abbreviations "A.D." and "B.C." | .. | X | X | .. | .. | .. | .. | X | X | X | .421 | .053 |
| 16. Words derived from names of groups of persons and organizations | .. | X | X | .. | X | X | .. | X | .. | .. | .395 | .158 |
| 18. Names of particular places and things | .. | .. | X | X | X | X | X | X | X | X | .300 | .042 |
| 19. Names of persons | X | X | X | X | X | X | X | X | X | X | .291 | .043 |
| 21. Complimentary close of a letter | .. | .. | X | .. | X | .. | X | .. | .. | .. | .263 | .000 |
| 22. Title preceding a name | .. | .. | .. | .. | X | X | X | X | .. | X | .216 | .018 |
| 23. First word of a sentence | X | .. | X | X | .. | .. | X | .. | X | X | .210 | .033 |
| 24. The pronoun "I" | .. | .. | .. | .. | X | X | X | X | .. | X | .193 | .000 |
| 25. Names of the days of the week | X | .. | X | .. | .. | X | .. | X | X | X | .171 | .000 |
| 26. Names of the months of the year | .. | .. | .. | .. | .. | X | .. | X | .. | X | .131 | .013 |
| 27. First word of a direct quotation which is a complete sentence | .. | .. | .. | X | .. | .. | X | .. | X | X | .123 | .000 |
| 28. Names referring to the Deity | .. | .. | .. | .. | .. | .. | .. | X | .. | .. | .105 | .035 |
| 29. Salutation of a letter | .. | .. | .. | .. | .. | .. | X | .. | .. | X | .079 | .000 |
| Use of small letters for— | | | | | | | | | | | | |
| 17. First word of the second part of a direct quotation unless the first word begins a new sentence | X | .. | X | X | .. | X | X | X | X | X | .333 | .140 |
| 20. First word of any direct quotation which is not a complete sentence | X | X | .. | .. | X | X | .. | X | X | .. | .289 | .447 |
| 30. All words in indirect discourse except the first word of a sentence | .. | .. | .. | .. | .. | .. | .. | .. | X | .. | .017 | .000 |
| Total | 15 | 17 | 22 | 15 | 18 | 21 | 21 | 24 | 21 | 25 | ..... | ..... |
| Average | .. | .. | .. | .. | .. | .. | .. | .. | .. | .. | .457 | .131 |

vidual or for a group as a numerator of a fraction, in which the denominator shall represent chances for error."[1] Since the error quotient considers the number of mistakes with relation to the number of opportunities to make mistakes, it is a much more significant and valid measure of the prevalence of error than is a mere count of errors.

Table III reveals several significant facts. First, marked variation characterized the extent to which the various uses of capital letters had been mastered by the ten sixth-grade pupils represented in the table. The error quotients for the preliminary test show that the error hazards involved in Item 1 as compared with the error hazards involved in other items were approximately of the following ratios: with Item 12, two to one; with Item 21, four to one; with Item 27, eight to one; with Item 29, twelve to one; and with Item 30, fifty-eight to one. Second, there were marked differences in the mastery of certain usages involving similar elements, as is shown by the differences between the error quotients in the following items in the preliminary test: 8 and 18, 10 and 19, 11 and 16, and 21 and 29. Third, errors were made by all ten pupils on Items 1, 2, 3, 4, 5, 6, and 19. Fourth, the pupils varied greatly in the number of difficulties encountered. Pupil 34 experienced difficulty with twenty-five items, while Pupils 16 and 22 encountered difficulty with only fifteen items. Fifth, the pupils manifested marked individuality in the errors that were made. Thus, while Pupils 16 and 22 each made fifteen errors, only eleven of the errors were made by both.

The fourth step in the program consisted in giving remedial instruction to overcome the difficulties encountered by the pupils in the preliminary diagnostic test. At this point the diagnostic chart, a section of which is reproduced in Table III, proved very helpful. The remedial instruction was organized as individualized group instruction. In the case of those items which gave difficulty to a majority of the pupils group instruction was employed. When only a limited number of pupils experienced a given difficulty, instruction was organized for the particular pupils concerned. Individualization of the remedial work was made possible through the

[1] Martin J. Stormzand and M. V. O'Shea, *How Much English Grammar?* p. 14. Baltimore: Warwick & York, Inc., 1924.

use of *A Student's Work-Book in Capitalization*[1] in which the exercises are organized in such a way that each pupil secures teaching and practice on the items which give him difficulty.

The final step in the project consisted in measuring the amount of improvement resulting from the remedial work. For this purpose

TABLE IV

IMPROVEMENT MADE BY THE NINETEEN SIXTH-GRADE PUPILS WHO FELL BELOW THE GRADE STANDARD IN THE PRELIMINARY TEST IN CAPITALIZATION

| Pupil | Preliminary Test | | | Final Test | | |
|---|---|---|---|---|---|---|
| | Score | Number of Usages on Which Errors Were Made | Error Quotient | Score | Number of Usages on Which Errors Were Made | Error Quotient e |
| 16 | 83 | 15 | .217 | 120 | 1 | .016 |
| 17 | 83 | 24 | .341 | 116 | 4 | .031 |
| 18 | 82 | 17 | .295 | 103 | 10 | .101 |
| 19 | 81 | 18 | .318 | 109 | 6 | .054 |
| 20 | 79 | 22 | .372 | 124 | 0 | .000 |
| 21 | 77 | 22 | .380 | 99 | 11 | .132 |
| 22 | 76 | 15 | .287 | 110 | 5 | .047 |
| 23 | 75 | 20 | .232 | 102 | 8 | .085 |
| 24 | 74 | 18 | .225 | 87 | 14 | .178 |
| 25 | 74 | 22 | .426 | 120 | 3 | .031 |
| 26 | 70 | 21 | .357 | 93 | 11 | .116 |
| 27 | 70 | 18 | .240 | 107 | 8 | .070 |
| 28 | 69 | 21 | .364 | 105 | 10 | .116 |
| 29 | 68 | 24 | .457 | 109 | 7 | .109 |
| 30 | 68 | 24 | .395 | 101 | 9 | .132 |
| 31 | 68 | 21 | .357 | 107 | 7 | .078 |
| 32 | 63 | 21 | .372 | 109 | 10 | .101 |
| 33 | 36 | 26 | .713 | 90 | 19 | .271 |
| 34 | 20 | 25 | .713 | 107 | 5 | .047 |
| Median | 74 | 21 | .357 | 107 | 8 | .085 |
| Average | 69 | 21 | .372 | 106 | 8 | .090 |

the Guiler-Henry Retest in Capitalization was used. This test was the equivalent of the preliminary test in content and in difficulty. Table IV, together with the last two columns of Table III, records the amount of improvement that was made.

Several significant facts are revealed by an analysis of the data contained in Tables III and IV. First, marked improvement in abil-

[1] Walter S. Guiler and Ralph L. Henry, *A Student's Work-Book in Capitalization*. A Plan for Individualizing the Study of Capitalization. Hamilton, Ohio: Hill-Brown Printing Co., 1927.

ity to capitalize was made by the nineteen pupils who were given remedial instruction. This statement is well substantiated by three types of data. (*a*) The error quotients in the final test were much lower than those in the preliminary test. The average error quotient for all the items of usage covered by the tests (Table III) was .457 for the preliminary test and .131 for the final test. In seven of the thirty items the error quotient was reduced to .000. The average error quotient for the nineteen pupils (Table IV) was reduced from .372 in the preliminary test to .090 in the final test. (*b*) The average number of usages on which errors were made was reduced from twenty-one in the preliminary test to eight in the final test. (*c*) The average pupil score was increased from 69 in the preliminary test to 106 in the final test. Interpreted in terms of the grade standards given in Table II, this gain in scores means that the average achievement of the nineteen pupils was raised from considerably less than sixth-grade standard to eleventh-grade standard. When individual scores are considered, it is found that all the pupils receiving remedial instruction attained the standard for their grade in the final test, whereas all were below standard in the preliminary test. Second, the pupils varied greatly in amount of individual improvement. Third, it is found that certain uses of capital letters are much more difficult to learn than are other uses. In this connection, the contrast in the error quotients in the final test may be noted for Items 3, 4, 5, 6, 9, 12, and 20 as compared with those for Items 13, 21, 24, 25, 27, 29, and 30. Fourth, the error quotients in the final test indicate that the teaching of certain uses of capital letters should be deferred beyond the sixth grade.

The following statements, which are supported by the data that have been presented, are made by way of summary and conclusion.

1. Ability in capitalization is a composite of ability in many specific usages; for this reason, learners may be expected to encounter difficulty on one or more of many items.

2. The thirty-four sixth-grade pupils studied varied greatly in their mastery of the field and in their mastery of specific usages. The score of the best pupil in the preliminary test was approximately six times that of the poorest pupil. This difference in scores indicates a range of achievement representing at least five grades.

3. Many of the sixth-grade pupils exhibited marked weakness in the ability to capitalize; a considerable number were deficient in several usages which presumably had been mastered in earlier grades.

4. A distinct need for much individualized remedial instruction was apparent.

5. Training in the uses of capital letters should not be relied on to transfer from one usage to another in any significant degree.

6. Marked improvement in ability to capitalize may be expected when a remedial program first discovers the usages which are difficult for the group and for individuals and then provides self-teaching and practice materials of types definitely suited to individual needs.

# ENGLISH WITHOUT APOLOGY

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A few years ago the study of grammar was looked on with disfavor by many English teachers. Remnants of the disfavor remain in various places, but "functional grammar," so-called, apparently is again included in most courses of study in the elementary schools. Notwithstanding the return of grammar to favor, there still is prevalent an antagonism toward teaching other phases of the technique of expression in the branch of elementary English known as "composition." In the parlance of modern English teachers certain words carry meanings peculiar to the subject of English: "composition" connotes free expression, self-expression, and is concerned with inspiration and "thought material" rather than with technique.

"Technique" as applied to the art of expression is a term commonly misunderstood. It may be explained briefly as *a ways and means of organizing and manipulating material to obtain desired effects.* Those aiming to teach self-expression assume that all technique except grammar must be hidden from sight in a respectable English course. Classroom procedures show that it is actually being taught but that it is presented with apologies and that attempts are made to give it another name. However, the changed attitude toward grammar may be a forerunner of a more favorable attitude toward the entire study of technique in expression.

The skeptical attitude of adults and near-adults toward the study of the English language has no doubt influenced teachers and authors of English textbooks to seize the phrases "thought material," "self-expression," and the like and to make use of them at every opportunity. No one can criticize subjects thus vaguely named because no one is sure what they are. English may be useless, or at best commonplace, as a subject for teaching and studying, but "thought material" and "self-expression" sound intriguing and impressive. The latter term is dear to the hearts of those who have occasion to

speak in modern educational phraseology, and its use is not confined to English teachers. Gilbert Murray in a recent article in *Harpers Magazine* calls the worship of self-expression a "vicious dogma" in education and says:

> Lastly, there has been the false theory: a theory which has already done a vast amount of harm in education and is still running riot in the sphere of art. I mean the worship of self-expression. I will leave art aside for the present, but in education I believe this vicious dogma is approaching its unlamented burial. No doubt it had some psychological excuse for coming into existence as a protest against an excessive authoritarianism which tried to turn out all pupils according to one pattern. It was right to consider each pupil's character and personality and train it in appropriate ways. But to suggest that the pupil's whole duty is to express himself, and the teacher's whole duty to help him to do so, seems to me to be the direct contrary of true education.[1]

Because English as a classroom study is vitally concerned with the study of expression, it has naturally received a large amount of attention from enthusiastic supporters of the theory of self-expression.

Justifying the study of English evidently is one of the duties of the teacher. One recent English textbook for junior high school grades tells the pupils that "today our life together in city, state, and nation has become so complex that only a very skilful use of language enables it to continue."[2] This statement seems to be intended as a sales talk for the study. Even though a seventh-grade child is not easily aroused over the complexity of life and does not understand the phrase, the statement has served a purpose if it sounds impressive to him. The author is doing her best to advance the cause of English.

Because of the amount of effort expended in the cause of English, it may be concluded that there is need for a promotional program. The efforts to impress the pupils with the value of the study are accompanied by almost pathetic struggles to convince them of its interesting qualities. Authors and teachers make frequent use of the word "interesting," urging their pupils to tell an interesting story, have an interesting discussion, contribute interesting ideas, think of

[1] Gilbert Murray, "The Crisis in Morals," *Harpers Magazine*, CLX (January, 1930), 136.

[2] Edith E. Shepherd, *Guidance in Composition*, pp. 1–2. Indianapolis, Indiana: Bobbs-Merrill Co., 1928.

some interesting experience. They seem to forget that demanding interest is an uncertain method of gaining it. One author, in attempting to make the study of English inviting to ninth-grade pupils, talks of "catching netfuls of words"[1] and "well-packed sentence parcels."[2]

Those concerned with the teaching of English are striving valiantly to make the study function and to make it reasonably popular with the pupils who are forced to study it. In order to accomplish their purpose, some take the defensive attitude from the beginning and sprinkle their pages generously with assurances of the delight and interest to be found in the study. Some approach the subject with apologies and continue the apologetic attitude. Others try to hide the fact that the subject under study is English. Some assure the pupils that life and everything in the world are extremely interesting and that, as the study of English is the study of life itself, it cannot fail to interest them. The study of literature is approached with less apology than the courses in constructive English termed "composition."

Authors of textbooks in history are not given to talking about "netfuls" of history. Science teachers apparently do not find it necessary to assure pupils over and over that certain experiments are interesting. Why is it necessary to apologize for and to camouflage the study of English? Pupils study French, Spanish, and other foreign languages in order to understand the speech of others and to use the languages as a medium of expression. Why should they not study English for the same reasons?

The fact that pupils in school and people generally are well satisfied with their skill in expression is probably responsible for the lack of interest in the study of composition. If the champions of English would cease lecturing about the value of the English language, discard many of their charming tricks and devices, dispose of the camouflage, forget to assure the pupils that English is interesting, and frankly teach English as a language, perhaps they would have greater success. Enlightenment will enable a pupil to contrast

[1] Elizabeth Hill Spalding, *English at Work*, p. 53. Yonkers-on-Hudson, New York: World Book Co., 1929.

[2] *Ibid.*, p. 63.

his product with something better and thus will destroy his satisfaction with the inferior quality of his own work. If he is able to make the contrast, he will see the reason for the study and will be interested in studying to improve his ability, in so far as he can be led to action. Teaching, in practice if not in idealistic theory, has its limitations, and pupils have their preferences in study.

The best way to impress pupils with the power and importance of language is to give them an appreciation of its flexibility and to increase their facility in using it for their own purposes of expression. Mastering technique does not inhibit ideas; rather, it releases them and brings freedom in self-expression. There is slight reason for creating the desire for expression in a person who has no means of releasing his desire and little use of pouring ideas into a tongue-tied creature for the sole purpose of promoting his self-expression. Without technique, either natural or acquired, ideas remain unreleased or half-expressed.

B. H. Bode, of Ohio State University, says in the *English Journal:* "The question of the teaching of English is bound up with the question why we should teach anything at all. If we leave aside considerations of practical utility, this question takes us back to the question of what constitutes a liberal education or the good life."[1] English composition has practical utility and, as subject matter alone, surely can stand with other subjects of the present curriculum when their contributions to education in its broader sense are considered. If we believe in the bliss of ignorance and the folly of wisdom, why teach anything at all? Why apply this theory to English if not to other subject matter? The unenlightened are satisfied with the crude. Shall we apologize for teaching them the greater beauty in more finished products?

[1] B. H. Bode, "Concerning the Teaching of English," *English Journal*, XVIII (May, 1929), 386.

# Educational Writings

## REVIEWS AND BOOK NOTES

*European influences on American education.*—People who migrate to a new country usually establish three types of institutions: those which are direct imitations of the institutions of the mother country, those which represent modifications of old institutions, and those which are entirely products of the new environment. With respect to education, the American colonists of the seventeenth century did little more than transplant the institutions of the Old World. About the middle of the eighteenth century, however, and especially after the American Revolution, there was a distinct tendency to reorganize education in terms of the needs and demands of American life. For half a century or more the educational leaders of this country charted their own educational course, little concerned with what was taking place in other parts of the world. In the meantime, certain significant changes were taking place in European education, especially in Prussia, where by 1830 there had been established a highly effective system of state schools.

During the second quarter of the nineteenth century the intellectual contacts between Europe and America became more frequent and more vital. Beginning about 1820, American educators became keenly interested in the educational policies and practices of Europe. This contact with Europe was especially significant because it came at a time when America was formulating its own basic educational policies and practices. Such leaders as William C. Woodbridge, John Griscom, Calvin E. Stowe, A. D. Bache, Horace Mann, and Henry Barnard visited Europe and reported their observations. These reports had a marked influence on American education, especially those which gave an account of the school system in Prussia. There can be little doubt that the example of Prussia did much to stimulate the common-school revival in this country. The influence of Prussia was especially marked in the establishment of the state superintendency, in the establishment and organization of normal schools, and in the stimulation of the existing tendency to grade the elementary school. These early reports did much, too, to make known to American teachers the principles of Pestalozzi and other educational reformers.

A recent book,[1] edited by Edgar W. Knight, contains the essential parts of three reports on education in Europe. The first report is that of John Griscom

[1] *Reports on European Education by John Griscom, Victor Cousin, and Calvin E. Stowe.* Edited by Edgar W. Knight. New York: McGraw Hill Book Co., Inc., 1930. Pp. 320. $2.25.

entitled "A Year in Europe," which was published in 1823. Griscom sailed for Europe in April, 1818, and returned in June, 1819. The story of his trip was published in two volumes. Professor Knight has presented only those portions of the work which relate to education. Griscom was very enthusiastic about the monitorial system of Lancaster; he observed and commented critically on the educational experiments of Fellenberg at Hofwyl, of Pestalozzi, of Robert Owen, and of numerous reformatory and charitable institutions.

The second report is that of Victor Cousin. In 1831 Cousin visited Prussia for the purpose of making a careful study of the public-school system of that country. He submitted his report to Guizot, minister of public instruction of France, in 1831. The report was translated into English in 1834, and part of it was reprinted in New York in 1835. The report is an excellent description of the Prussian system of elementary and normal schools. It was widely read in the United States and did much to emphasize the importance of state control of education and the need for the establishment of teacher-training institutions.

The third report is that of Calvin E. Stowe. In 1836 Stowe was sent to Europe to purchase a library for the Lane Theological Seminary in Cincinnati. Before he left Ohio, the state legislature authorized him to make a study of European school systems and to report his observations and recommendations to the legislature. On his return from Europe in 1837 Stowe made a report in which he described enthusiastically the system of elementary schools in Prussia. Moreover, Stowe was firmly convinced that many aspects of the Prussian system not only could be but should be put into operation in Ohio. Stowe's report is an important document in our educational history. The legislature of Ohio ordered ten thousand copies published and distributed throughout the state. Later the report was ordered reprinted by the legislatures of Massachusetts, Michigan, North Carolina, Pennsylvania, and Virginia.

The reports are carefully edited and indexed. Professor Knight has rendered a real service by making readily available these three reports on European education.

NEWTON EDWARDS

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*A manual on research techniques for the investigation of instructional problems.*—During recent years the members of the educational profession have manifested a decided growth in amount of "research-mindedness." This movement has gone through two stages. The first was that in which educational problems were attacked by ready-made procedures and by such hit-or-miss methods of investigation as untrained research workers could discover. The second is that in which we are taking more thought regarding the methods by which we shall attack problems that need investigation. We discovered how crude and unsatisfactory were our research tools and set about inventing new ones and improving old ones. Waples and Tyler have added a new book[1] to the growing list of volumes that have been published for the training of research workers.

[1] Douglas Waples and Ralph W. Tyler, *Research Methods and Teachers' Problems: A Manual for Systematic Studies of Classroom Procedure.* New York: Macmillan Co., 1930. Pp. xxiv+654. $3.50.

In a sense this volume is a combination of a manual of research techniques and a manual on methods of teaching. It contains so much good material on how to teach that the classroom teacher will find considerable help and guidance on purely instructional activities. The emphasis on research techniques gives the master key for the solution of other instructional problems.

The authors, in the very beginning, make an important distinction between "service" studies and research studies. Much of the volume is devoted to what they class as "service" studies. By these they mean investigations of a practical nature seeking to solve immediate difficulties or to deal with cases or situations that are actually present in a teacher's own school or classroom. These are contrasted with research studies which seek to discover truths of more universal application and to get down to the more fundamental assumptions. In the opinion of the reviewer, this willingness to render service to the practical worker who only wishes to go half-way in research is one of the outstanding contributions of the volume. Perhaps the reason for the fact that few classroom teachers engage in research lies in the failure to distinguish between a little and a great deal of research. Perhaps if plans of attack are set up which are not incumbered with excess baggage and which are not hedged about by the intricate machinery of highly technical and precise measurements, a larger percentage of teachers can be enlisted in the army of research workers.

Neither the authors nor the reviewer would criticize or oppose the use of exact, precise, and highly-specialized research procedures in the solution of educational problems. These must always be employed, and in greater and greater degree. In the meantime, however, it will be well for us to enlist a large number of workers and put them to work with simple tools attacking the less profound but more immediately practical problems of classroom instruction. This book is a valuable guide and manual for this practical type of research, and as such it is a valuable contribution to education.

C. C. CRAWFORD

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*Manual for a new standardization of performance tests.*—A new manual[1] gives detailed directions for giving and scoring two series of performance tests which are designed to be used as comparable, parallel forms. Tables are given by means of which scores may be translated into points and points, in turn, into mental ages. From the mental ages intelligence quotients are found as in the Binet scale. The scales are designed primarily for clinical use. Their purpose is to supplement the language scales by securing measures of the mental ability of children who, because of unfamiliarity with English or because of deafness, cannot well be tested by the usual scales and by distinguishing the special ability possessed by some individuals to solve problems of a concrete nature. The description of the procedure followed in standardizing the scales is to be published in a subsequent volume.

FRANK N. FREEMAN

[1] Grace Arthur, *A Point Scale of Performance Tests:* Clinical Manual. New York Commonwealth Fund, 1930. Pp. x+82. $1.50.

*An investigation of current practices in the diagnosis and treatment of atypical children.*—During the past decade much attention has been given to the needs of children who are so atypical that they cannot receive adequate instruction in ordinary classes. Interest in the special training of such children has been manifested in school organization and in the publication since 1920 of several hundred books and articles dealing with the problems involved in training special types of exceptional children. A recent study by Hilleboe[1] is a significant addition to the comparatively small number of general references in the field.

Hilleboe's study deals with the following problems in the education of atypical children: the classification of such children from the point of view of selection for special education; the determination of the probable percentage of children in each of these classifications and the relating of a program for atypical children to the state's minimum program; and, more fully, the consideration of current practices in the selection, diagnosis, assignment, and follow-up study of each of the classifications of atypical children. The author classifies atypical children as follows: (1) the mentally atypical: (*a*) the mentally subnormal, (*b*) epileptics, (*c*) the mentally supernormal; (2) the physically atypical: (*a*) visual defectives, (*b*) hearing defectives, (*c*) speech defectives, (*d*) orthopedic defectives, (*e*) cases of lowered vitality; (3) the temperamentally atypical: (*a*) neurotics, (*b*) truants, incorrigibles, and delinquents; (4) the multiple handicapped.

The data for the study were obtained from the following general sources: (1) an analysis of the literature in the field with special attention to reports made since 1920, (2) investigation of special-class facilities in eighteen cities, and (3) interviews with specialists in different fields of education.

One may object to certain minor features of the author's work, for instance, his inclusion of speech defectives in the general class of the physically atypical. Nevertheless, the study as a whole is a valuable summary of a wide range of data and should be useful to all who are interested in the special education of atypical children. The classified bibliography of 321 references is one of the important contributions made by the author.

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*A symposium on the emotional life of the child.*—The Mid-West Conference on Character Development, under the auspices of the Chicago Association for Child Study and Parent Education, was held in Chicago in February, 1930. The conference program was built up around the subject of the emotions of the child. Lectures on this subject and closely allied topics were presented by noted educators, psychologists, sociologists, social workers, and physicians. This conference has become an annual event, and each year its program has been built up around

[1] Guy L. Hilleboe, *Finding and Teaching Atypical Children.* Teachers College Contributions to Education, No. 423. New York: Teachers College, Columbia University, 1930. Pp. vi+178. $1.75.

a different topic. "The topic chosen for the conference [in 1930] was planned to emphasize the important truth that other factors than the physical and intellectual ones determine the development of children" (p. v). The keynote of the conference is well stated in the Foreword of the proceedings[1] by Ellsworth Faris.

> It has long been recognized that emotional conditions of adults are highly important for the life of the children. Repeatedly in this volume has this point been emphasized, and renewed insistence is given to the dictum that the training of children is to a large extent dependent upon the education of parents. Perhaps one ought always to add upon the education of teachers also [p. vii].

Twenty-seven addresses given at the conference have been included in the proceedings which have recently been published. A large amount of data dealing with the development of children is available, but little of the material hitherto available deals with emotional development. The whole field of emotions is just beginning to be explored, and there is much to be discovered if our knowledge in this field is to keep pace with our knowledge in the fields of mental and physical development. Therefore, the discussions included in this book are of timely interest as they "present a valuable symposium of the opinions of specialists concerning the basic emotions, including, among others, fear, anxiety, religious feeling, and the sexual emotions" (pp. v–vi). It is not to be expected, however, that this conference solved the problem of the child's emotional life. "The reader who looks here for a solution to all his problems will be disappointed, since the scholars who took part in the program, being competent scientists, have stressed the importance of research with the implied insistence that much of what we desire to know is still undiscovered" (p. vi).

As has been stated previously, this book contains discussions of emotions and related subjects. The titles of some of the lectures are: "Hereditary and Environmental Factors in the Emotional Life of the Child," "The Development of Basic Emotions," "Psychological Trends and Emotional Theory," "Emotional Expression and Repression," "Physiology of Hunger and Appetite in Relation to the Emotional Life of the Child," "Control of Emotion through Relaxation," "The Validity of Some Measures of Emotional or Nervous Instability in Children," "A Study of Emotional Maladjustment," "Some Determinants of Emotional Stability," and "Psychoanalytic Interview as a Method of Research on Personalities." The emotional life of the child as it is affected by social institutions and relationships is treated, as well as emotional problems of children at different ages, different types of emotional experiences of children, and the problem of the parents and of the school with respect to the emotional life of the child.

[1] *The Child's Emotions.* Proceedings of the Mid-West Conference on Character Development, February, 1930. Chicago: University of Chicago Press, 1930. Pp. x+406. $2.50.

The discussions represent the views of authorities in different fields, which, it should be remembered, were presented to an audience composed largely of laymen and not of scientists. Some of the addresses are highly scientific, while others are of a more popular style. Some are based on objective data, while others are based on subjective data. Some contain facts; some, opinions. The book as a whole, however, is adequately evaluated in the following words of Professor Faris: "There is presented here a body of authoritative statements which will be a distinct contribution to the knowledge of every layman and ought to result in an attitude of scientific humility" (p. vi).

LEE O. GARBER

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*Practical suggestions for the rural teacher.*—There are in the United States more than 150,000 one-room schools. Although the consolidated-school movement has made notable headway during the past decade, it is very likely that a considerable percentage of rural children will attend one-room schools for some time to come. It is common knowledge that many, if not most, of the teachers in these schools have been inadequately prepared for the work which they are undertaking to do. Moreover, these teachers often work more or less in isolation from other members of their profession. Under prevailing conditions it is difficult to induce rural teachers to put into practice the principles of school organization and methods of teaching which have been proved sound.

The author of a recent book[1] undertakes to formulate for the rural teacher the objectives of her work and to suggest means and methods of accomplishing those objectives. There is little in the book that is new or theoretical, the purpose of the author being to acquaint the rural teacher with accepted principles and procedures governing both her personal and professional conduct and the conduct of her school. The first four chapters of the book deal with what the author designates as "citizenship and character objectives," special attention being given to the personal influence of the teacher in discipline, to thrift for teacher and pupil, and to the purpose and methods of publishing a school paper. The next five chapters are devoted to a consideration of general instructional objectives. Attention is given to such matters as the general objectives in teaching and study, individual instruction, project procedures, the use of tests, remedial drill, individual practice materials, questioning and assignments, the socialized recitation, rationalizing the recitation, and use and abuse of the textbook. An excellent chapter is devoted to the keeping of records and the making of reports. This chapter contains much illustrative material. Three chapters are devoted to particular instructional objectives, namely, objectives in reading, language, and civics. The book is concluded with chapters devoted to the following topics: developing dictionary skill, learning to use the library, training by educative seat activities, standards which a first-class rural school should meet, and standards of personal and professional conduct of the teacher.

[1] Frank J. Lowth, *The Country Teacher at Work*. New York: Macmillan Co., 1930. Pp. xii+542.

The greater part of the volume consists of practical suggestions and of illustrative materials. In giving advice to rural teachers, the author has steered a middle course between abstract, theoretical discussion on the one hand and a presentation of detailed, testing devices and class exercises on the other. The suggestions are, as a rule, sufficiently definite to have meaning, and the illustrative materials with which the book abounds should be especially valuable in enabling the teacher to apply the suggestions in her work. The advanced student of education will not profit greatly by reading the book, but the book should be very helpful to the intelligent rural teacher and should serve as a suitable textbook in courses designed for teachers in rural schools.

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*Reading in the primary grades.*—A recent book[1] is a treatment of a very limited field by specialists who have a well-developed background for their writing. General phases of reading are covered in chapters on the history and social values of the subject, and scientific problems in the field are treated in chapters dealing with silent and oral reading and with eye-movements. In this connection it seems that a chapter might have been given to the contributions made to reading by means of tests. Certainly not a few phases of reading are better understood by the testing work which has been done.

The first chapter, which merits special attention, deals with motives for reading. This chapter gives an excellent treatment of special types of silent reading. The reviewer hastened through this part of the book hoping to find an analysis of the different types of reading in the form of directions telling how the different types of reading are to be done. Experiments with older children have shown that they do not make differences in their reading activities when told to read for different purposes. Aids which will enable teachers to deal with these different types of reading as skills or processes as well as from the standpoint of content are much needed. Another interesting chapter has to do with kindergarten training as it pertains to reading. This discussion emphasizes the importance of the development of mental attitudes which make it possible for the reading process of children to be initiated in an efficient manner. These problems, together with those in the discussion of the arrangement and equipment conducive to reading, come under the more general topic of latent learning in reading, a field in which little work has been done. Another topic which seems to be well treated is phonetics. The fact that different points of view and the experimental results are given indicates an attitude toward this problem different from that reflected by some writers. The suggestions given for teaching reading in the different primary grades are detailed and practical and will be studied with interest by large numbers of teachers. One question suggested here is: Why did the writers not consider it advisable to make a careful distinction between second- and third-grade reading? Their opinion may have been

[1] Grace E. Storm and Nila B. Smith, *Reading Activities in the Primary Grades*. Boston: Ginn & Co., 1930. Pp. viii+376. $2.00.

that Grades II and III represent a second period in the development of reading ability. The book closes with suggestions for testing and remedial work. In this section informal tests of different types are suggested, standardized tests are given by name, and simple methods for remedial work are set forth.

The book may well be recommended to intermediate- and upper-grade teachers. The value of the treatise for these persons is that they will be able to get a clear idea of the basis which often underlies the reading activities of their pupils. The reviewer has only one criticism to make. This criticism refers to the use of the old statement that "in the primary grades the child learns to read and that from then on he reads to learn." The reviewer believes that this statement has done the teaching of reading much harm in that the value of interpretation has often not been realized by primary-grade teachers and upper-grade teachers have sometimes thought it unnecessary to teach reading. That the reading process changes is doubtless true for many children. This book is evidence enough that many of the reading activities of the primary grades are interpretative rather than mechanical in nature, and certainly it has been shown clearly that skill in reading continues to develop beyond the third grade.

C. T. GRAY

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*A new approach to health education.*—Health education has for part of its aim the inculcation of habits, skills, attitudes, and knowledge concerning personal and public health. Most schools begin instruction looking to the formation of good health habits when the child enters school and continue the instruction as long as the child remains in the elementary school. One method of strengthening these habits is to rationalize them by means of knowledge of specific subject matter given as the child is ready for it. It has been hoped that right attitudes toward health would be developed in this educative process. To be effective, health education must be positive, dynamic, and inspiring.

A new aid to the forming of attitudes is supplied in a recent book[1] by Professor Downing. There are eleven chapters in the book: "The Pioneers," "Bacteria Cause Disease," "Prevention and Cure of Disease," "Insects as Disease Carriers," "The War on Disease Continues," "The Effects of These Discoveries," "Early Ideas of the Human Body and Its Work," "Malpighi and His Times," "Rival Physical and Chemical Theories," "New Light on Respiration," and "Some Modern Discoveries in Problems of Nutrition and Growth." The organization within the chapters is good.

Leeuwenhoek, Redi, Needham, Spallanzani, Priestley, and Pasteur are realistically portrayed in chapter i. The need for their work, the accomplishments of the scientists in their laboratories, and the spirit of the times in which they lived are vividly described. Koch and Lister were the men who showed that bacteria cause disease, and the book reflects the excitement of their discoveries.

[1] Elliot R. Downing, *Science in the Service of Health.* New York: Longmans, Green & Co., 1930. Pp. viii+320. $2.00.

The author maintains a scientific balance, and credit is given to those men whose work preceded the more elaborate findings. The descriptions of Jenner's work on smallpox vaccination; Pasteur's in preventing cholera, anthrax, and rabies; and the work of the long line of men whose research achieved diphtheria immunization, combined with the clear explanation of how the white corpuscles function, should go far in giving the pupil an attitude to fortify him against the arguments of the anti-vaccinationists and the anti-vivisectionists.

"Insects as Disease Carriers" is in itself an interesting topic, and, when handled by a biologist of the first rank, it becomes absorbing. Ticks, mosquitoes, and flies have a place of importance in the economic scheme and in man's health. Man's ingenuity is severely taxed in overcoming these enemies. Chapter iv clearly shows how painstaking man must be, how baffling a problem these small creatures cause, and how the scientist masses his forces for our good.

Chapter vi is most helpful in creating attitudes. It gives authentic data in tables and graphs to show the results of various important discoveries in the saving of life. Diseases such as smallpox, diphtheria, and typhoid fever are treated specifically, and the reductions in the number of cases and in the death-rates are given objectively. This chapter is an attempt to educate children so that they will be invulnerable to the arguments of unscientific propagandists.

The early lack of knowledge about the body is well described. The mistakes of other generations are pointed out, but they are not subjected to ridicule. The reader feels a sympathy for the early workers and an intense respect for the amount of knowledge secured with the meager tools that were available.

The Appendix to the book is especially valuable. Explicit directions for twenty-nine demonstrations are given. These directions are of such simplicity that a teacher who has had a minimum of training in science can give the demonstrations. In many instances the pupils can be the demonstrators. The Index increases the value of the book for reference.

This book is unique in its introduction of material dealing with biology. The life-histories of numerous creatures are given. Concepts of new words and scientific terms are developed so as to give comprehensive meanings, for example, "thesis" on pages 19–20, "inoculate" on pages 66–67, "phagocyte" on page 83, and others.

Many illustrations are included, which have been well chosen and well reproduced. The pictures of the scientists help to make these men seem human to the pupils. In the illustrations that are magnified it would have been well to give the magnification or to indicate the actual size of the specimens.

The reviewer feels that there is an omission—no women are considered in this book. Madame Curie has made a great contribution to health; and girls, as well as boys, need inspiration to make them realize that they can be true scientists.

There have been few contributions of the type of this book. The author sets a very high standard for those that are to follow. The book is well written in language that is forceful yet simple enough for junior high school pupils. The

interest is sustained throughout, and it is a book that will stimulate further reading and study and encourage independent investigation.

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### GENERAL EDUCATIONAL METHOD, HISTORY, THEORY, AND PRACTICE

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BALDWIN, WILLIAM A. *From the Old to the New Education.* Boston: New England Publishing Co., 1930. Pp. 192.

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BRUECKNER, LEO J. *Diagnostic and Remedial Teaching in Arithmetic.* Philadelphia: John C. Winston Co., 1930. Pp. x+342.

CABOT, STEPHEN P. *Secondary Education in Germany, France, England and Denmark.* Harvard Bulletins in Education, Number 15. Cambridge, Massachusetts: Harvard University Press, 1930. Pp. xii+110. $1.00.

CARROLL, HERBERT ALLEN. *Generalization of Bright and Dull Children:* A Comparative Study with Special Reference to Spelling. Teachers College Contributions to Education, No. 439. New York: Teachers College, Columbia University, 1930. Pp. viii+54. $1.50.

CHANDLER, PAUL G. *Some Methods of Teaching in Six Representative State Teachers Colleges of the United States.* Teachers College Contributions to Education, No. 425. New York: Teachers College, Columbia University, 1930. Pp. vi+150. $1.50.

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KNAPP, THAD JOHNSON. *Educational Insurance:* Stopping the Failures or Making Education Certain by the Fixing of Desirable Habits. Boston: Stratford Co., 1930. Pp. viii+132. $2.00.

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PATERSON, DONALD G., ELLIOTT, RICHARD M., and OTHERS. *Minnesota Mechanical Ability Tests.* Minneapolis, Minnesota: University of Minnesota Press, 1930. Pp. xxii+586. $5.00.

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Bulletin No. 12, 1930—*National Ministries of Education* by James F. Abel.

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Pamphlet No. 7, 1930—*National Advisory Council on School Building Problems: Its Organization, Purposes, and Methods* by Alice Barrows.

Pamphlet No. 8, 1930—*An Age-Grade Study of 7,632 Elementary Pupils in 45 Consolidated Schools* by D. T. Blose.

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